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The Canadian Geographical Society

OTTAWA, CANADA

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and peoples of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—first of Canada, then of the British Empire and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

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CANADIAN GEOGRAPHICAL JOURNAL

Editor - Gordon M. Dallyn

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This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustration, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth, and other parts of the world in which Canada has special interest.

Contents

FEBRUARY, 1939 VOLUME XVIII No. 2

COVER SUBJECT:—A Cape Breton Sunset over the Gulf of St. Lawrence.

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DORA C.

CANADA'S MARITIME PLAYGROUNDS

by **ROBERT J. C. STEAD**

ESTABLISHMENT of national parks in Nova Scotia and Prince Edward Island extends to the Atlantic Coast the system of public reservations "dedicated to the people of Canada for their benefit, education and enjoyment" which had its origin at Banff more than fifty years ago. From a small beginning of ten square miles on the eastern slopes of the Rocky Mountains, Canada's national playgrounds have grown until they now reach from British Columbia to Nova Scotia and occupy an area of more than 12,400 square miles.

I have just used the term "national playgrounds" as a synonym for national parks. For national parks are playgrounds on a gigantic scale; they are areas in which forest, lake and landscape are preserved in their natural beauty; where wild bird and animal life is protected from the "arch-predator", Man; and where the peace and quiet of hill and valley are conserved against the noise and confusion of this clamorous age. It is these qualities which have made them national playgrounds in the fullest sense of the word; areas to which each year more than a million Canadians and visitors from other lands turn for rest and recreation.

Cape Breton Highlands National Park and Prince Edward Island National Park are the new maritime members of Canada's family of national parks. Thrust far into the Atlantic, the Island of Cape Breton occupies a place in Canadian history as unique as its physical setting. The date of its original discovery is cloaked in doubt, although there are strong grounds for the belief that John and Sebastian Cabot landed here in the summer of 1497. The memory of these explorers is perpetuated in the Cabot Trail, the spectacular highway which girdles the northern part of the Island. Later its coasts were sailed by Verrazano in 1524 and by Jacques Cartier in 1536. The fisheries of nearby waters attracted English, French, Spanish and Portugese, with resulting settlements at such points as English Harbour (later Louisbourg), St. Ann's, St. Peter's, Baie des Espagnols (Sydney), and Niganis or Niganich, now Ingonish. It is generally supposed that Basque or Breton fishermen first gave the name "Cape Breton" to the eastern promontory of the Island.

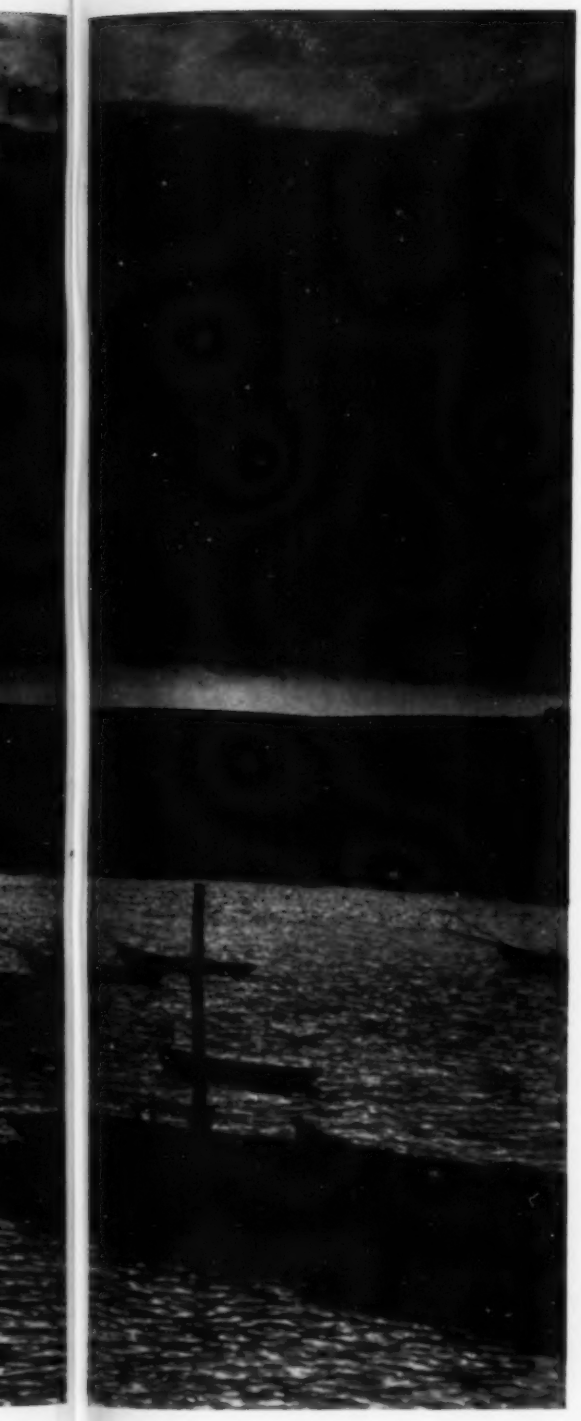
Ceded to France by the Treaty of Utrecht in 1713, the Island was re-named Ile Royale, and fortifications, then regarded as the greatest in America, were erected at Louisbourg, so named after Louis XIV of France. During a quarter of a century great sums of money were spent in building the fortress. Around this stronghold centred the great struggle between French and English for supremacy in North America. Its capture by the English in 1758 preceded the fall of Quebec and the end of French rule in Canada. Acadian settlement of parts of the Island continued after 1758, and was followed by extensive Scottish immigration between 1791 and 1828. Descendants of these early settlers still constitute a large part of the population.

On the physical side, Cape Breton presents attractions unique in North America. Separated from the mainland of Nova Scotia by the deep and narrow Strait of Canso — so narrow that it barely appears on the map, and the crossing is made by ferry in less time than on many a river — it nevertheless seems set apart from all the rest of the continent in the environment it offers to the visitor. A high, forested tableland forms the interior backbone of the Island, and drains by numberless brooks of soft amber-coloured water into the surrounding sea. The coastline is rugged and even grim, but broken by many bays and inlets, with small pastoral valleys. Good natural harbours afford facilities for small ocean craft. From the sea is presented an everchanging panorama of hill-side, cliff, and valley; from the land, equally beautiful vistas of sea, cape, jagged fingers of tide-worn rock, and the constant blue background of the Atlantic Ocean or the Gulf of St. Lawrence.

The new Cape Breton Highlands National Park stretches across the northern

Left:—Reflections — Swordfishing boats at South Ingonish, Cape Breton Island, Nova Scotia.

Evening at Neil's Harbour on the Atlantic coast, Cape Breton Island.



part of the Island and contains an area of approximately 390 square miles. The western shore, along the Gulf of St. Lawrence, rises abruptly, even precipitously from the water; the higher lands are forest-clad, and to their rugged sides clings the Cabot Trail, already mentioned, commanding views which are among the experiences of a lifetime. The eastern shores also are rocky, but with more numerous coves at the mouths of valleys that clamber back to the interior highlands. The scenery, although reminiscent of the Highlands of Scotland, has qualities peculiar to itself. The solitary grandeur mounted against the eternal cadence of the sea defies every art of description.

Clustered close to the park, but outside its boundaries, are a number of picturesque fishing villages, inhabited mainly by families of Highland Scottish or Acadian ancestry. For generations these hardy fisher-folk have won their substance from the sea, which abounds in cod, haddock, herring, lobster, mackerel, swordfish, tuna and halibut. Largely self-contained, the inhabitants have retained their native languages and a rare skill in handicrafts, including the arts of rug-hooking and weaving from native wool spun on ancient wheels. These fisher settlements afford an ideal setting for lazy tourist days, and lend an interest to the park and its environs hardly to be found elsewhere.

The park itself is clothed with forests in which spruce, balsam fir, birch, maple, and beech predominate, although pine, hemlock, oak, and poplar are also found. Small fruits — cherries, blueberries, strawberries, raspberries, gooseberries, and apples once tame but now growing wild — abound. Animal and bird life is being restored under the watchful eye of the park authorities. White-tailed deer, snowshoe rabbit, black bear, wildcat, red-fox, otter, muskrat, weasel and mink are native to the area. Beaver, recently reintroduced, are settling down in their new environment with the intelligence and industry for which Canada's emblem animal is justly famous. Grouse and a variety of smaller birds enliven the forests, and ducks and other species of waterfowl are common. Salmon and trout are caught as sport fish in the inland waters.

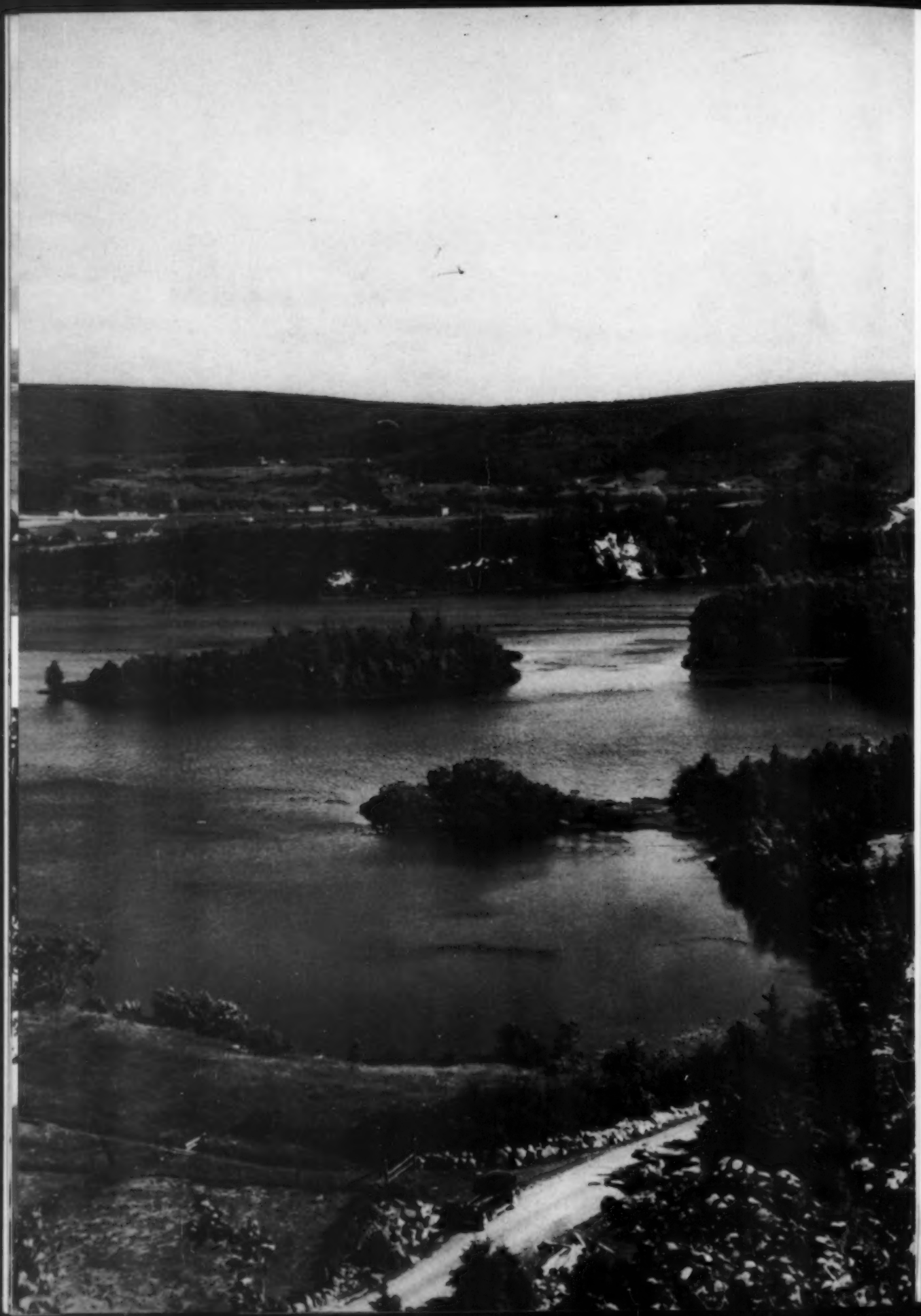
Cape Breton Island may be approached by paved highway from the mainland of Nova Scotia, the crossing of the Strait of Canso from Mulgrave to Port Hawkes-

Massive Cape Smoky guards the entrance to South Ingonish Harbour, Cape Breton Island.

Haying along the Cabot Trail. Fertile green valleys lie between the rolling hills of Cape Breton Island.

Rolling forested hills sweep back from the sea at South Ingonish, Cape Breton Island.

Part of the swordfishing fleet in South Ingonish Harbour, Cape Breton Island.



bury being made on a Government ferry at a nominal charge. This route is also tapped by a regular ferry service from Prince Edward Island to Pictou, Nova Scotia. From Port Hawkesbury the visitor has a choice of routes to the park. The western route, after winding through a generous variety of scenery, traverses the beautiful and fertile Margaree Valley, and joins the Cabot Trail at Margaree Forks. About four miles north of the important seaport village of Cheticamp it enters the park. Skirting the seashore for many miles before turning inland to cross the northern part of the Island, the Cabot Trail provides many magnificent vistas, and at one point reaches an altitude of nearly 1,300 feet. The Trail, quite passable in its present state for careful drivers, is being rapidly improved, and promises to become one of the great scenic drives of the continent.

Entry may also be made by an eastern route from the city of Sydney, which is reached by highway, a line of the Canadian National Railways, or water; thence by highway *via* Baddeck or Englishtown Ferry to Ingonish, or by regular steamship service from Sydney to Ingonish. An interior route by way of Whycocomagh and the Bras d'Or Lakes connects with the Cabot Trail at Baddeck. The nearest railway station is at Little Bras d'Or, about 65 miles from Ingonish. There are telegraph connection and regular mail service to principal points along the Cabot Trail.

The entrance to the park, by the eastern route, is at South Ingonish, where the administrative headquarters are located. Lying in the shadow of Cape Smoky, South Ingonish Harbour is one of the finest anchorages on the eastern coast and is frequented by many types of deep-sea craft. Just north of the harbour and within the park is a remarkable promontory known as Middle Head. It extends nearly two miles into the Atlantic beyond the normal coast-line, forming twin bays. Between Middle Head and South Ingonish Harbour is a magnificent beach and between the beach and the mainland lies a fresh-water lake. In the vicinity are being erected an administration building, Superintendent's residence, and registration office, designed in an architectural style to blend with the surrounding landscape.

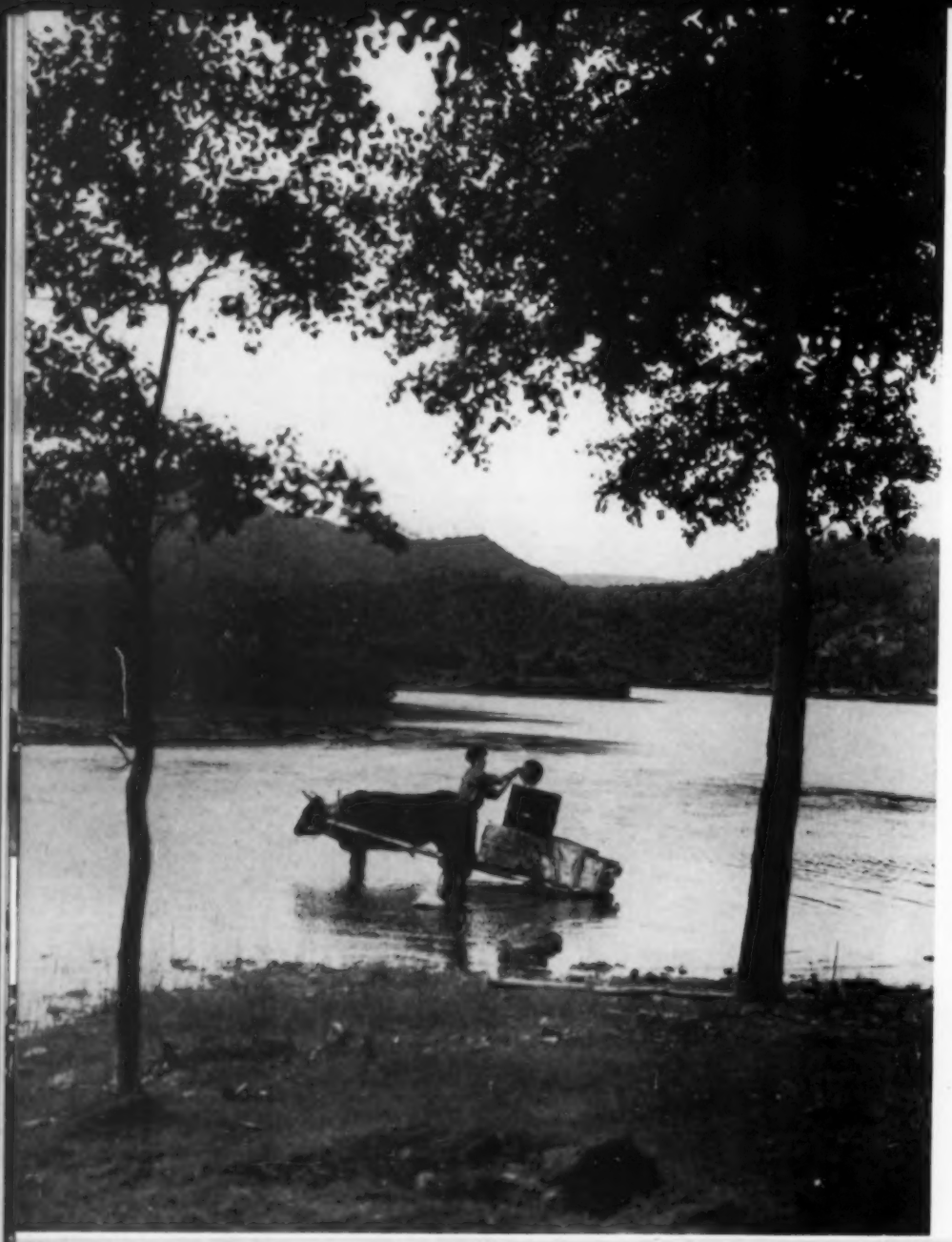
Opportunities for recreation in the park are varied, and include fishing, boating, bathing, hiking and motoring along the park roads. A golf course, designed by the noted golf course architect, Stanley Thompson, to utilize the picturesque terrain of the region, is being constructed in the vicinity of Middle Head, extending up the valley of Clyburn Brook. Provision of tennis courts, athletic grounds, parking and picnicking places is also being made. Inland fishing has already been mentioned. Deep-sea fishing enthusiasts may enjoy angling for swordfish, as one of the finest areas in the North Atlantic for this sport is located off the eastern coast of Cape Breton. Ingonish and Neil's Harbour are noted swordfishing centres.

Tourist accommodation, as yet of a limited nature, is available in many of the towns and villages adjacent to the park, including Cheticamp, Pleasant Bay, Cape North, Dingwall, Neil's Harbour, and North and South Ingonish. As development of the park proceeds it may be assumed that private enterprise will supply the necessary hotel and bungalow camp accommodation for the increasing thousands who are sure to seek this unique summer playground.

DISTINCT in character from the rugged grandeur of Cape Breton is Prince Edward Island. Jacques Cartier, who discovered the Island in 1534, noted in his journal that it was a land "low and flat and the fairest that may be possible to see, and full of beautiful trees and meadows." Its gently undulating surface, intensively cultivated and extraordinarily productive, presents a charming pastoral setting. The coast-line is very irregular, presenting a succession of bays and projecting headlands, with long stretches of sandy beach along the northern shore. Red sandy loam soil, overlying strata of red sandstone and red clay shale, is found almost everywhere throughout the Island and gives to the landscape a warm and colourful appearance.

Prince Edward Island, too, has a history of interest. Known for years as Ile St. Jean, or St. John Island, it was settled mainly by Acadians until the fall of Louisbourg Fortress in 1758. The present population is descended principally from English, Scotch, Irish and French Acadian

Left:—Looking across the fresh-water lake between North and South Ingonish, Cape Breton Highlands National Park.



An unusual view of the fresh-water lake in Cape Breton Highlands Park near South Ingonish.

Sturdy oxen have a place in every-day life on Cape Breton Island.

Natives of Cape Breton Island excel in handicrafts. This Acadian woman near Cheticamp is rug-hooking with native wool yarns.

A study in transportation. Drawing water with ox and cart at South Ingonish, Cape Breton Island.

settlers. Charlottetown, the capital, has been called the "Cradle of Confederation", for here was held, on September 1, 1864, the first conference which led to the federation of British North American colonies in 1867. It was not until 1873, however, that Prince Edward Island itself entered the union and became a province of the Dominion.

Prince Edward Island National Park is a seashore area extending as a narrow strip for nearly twenty-five miles along the northern coast. It includes some of the finest sand beaches in Eastern Canada. Landward from the beaches, sand dunes rise in many places to considerable heights, and across the mouth of several bays small sandy islands or shoals, formed by the action of the sea, give protection to the inner waters. The water is warmer than at many points along the Atlantic coast hundreds of miles further south, and the opportunities for surf-bathing are almost ideal.

The Park has, however, many other attractions. Within its area is located Green Gables, made famous by the novels of L. M. Montgomery. The old farmhouse, although repaired and re-decorated, has been retained in as much as possible its original style, and is open to visitors. In the immediate vicinity an eighteen-hole golf course has been constructed, into which have been woven the "Lake of Shining Waters" and other points of literary interest. Skirting the sand dunes and stretching back into the beautiful countryside, the new course combines many delightful features in a romantic and attractive setting.

The park headquarters are located at Dalvay House, a large building originally erected as a summer home, which has been re-designed for use as an administration centre. The surroundings are being landscaped and an area in the vicinity will be developed as a community and recreational centre, with playgrounds, tennis courts and a bowling green.

The delights of surf-bathing and relaxation on the beautiful broad beaches are enhanced by the perfect climate of the summer and early autumn. The temperature is ideal, and the air is always invigorating. Bath-houses have been provided for visitors at the Cavendish, Brackley and Dalvay beaches, and there are opportunities for boating, hiking, and deep-sea fishing. Motor roads skirt the seashore and provide attractive views of the Gulf of St. Lawrence. As yet there is little tourist accommodation actually within the park but a number of good summer hotels and tourist homes are operated adjacent to the main beaches, and, of course, in nearby Charlottetown.

Prince Edward Island Park is easily accessible by motor highway and lies within an hour's ride from Charlottetown, the provincial capital. A paved road runs within a short distance of the Cavendish region and the Brackley and Dalvay sections of the park are served by good provincial roads. A new park road which has been built from the eastern entrance near Dalvay House to the western extremity of Stanhope Beach provides access to a choice section of the park. The Island itself is reached from the New Brunswick mainland by ferry between Tormentine and Port Borden and also from Pictou, Nova Scotia, to Charlottetown.

When most of the national parks were established the land was already owned by the Dominion Government, and settlement had not encroached upon it to any appreciable extent. A different situation existed with respect to the new parks in Prince Edward Island and Nova Scotia, which was met by the Provincial Governments acquiring the land and turning it over to the administration of the federal authorities. The public-spirited attitude of owners, in making their lands available for this purpose, and the co-operation between Dominion and Provincial Governments, have made possible these valuable additions to Canada's system of national parks. Although still in the early stages of development, these new Maritime Playgrounds are already attracting visitors in increasing numbers each summer. Washed by the Gulf and the broad Atlantic, they stretch beckoning fingers to the tourist from Europe and the countries to the south, and as they are regions of never-ceasing interest to Canadians from other provinces there is little doubt that they are destined to be among the most popular holiday resorts on the continent. They round out Canada's national playgrounds family — playgrounds of the mountains, playgrounds of the prairies, and playgrounds by the sea.

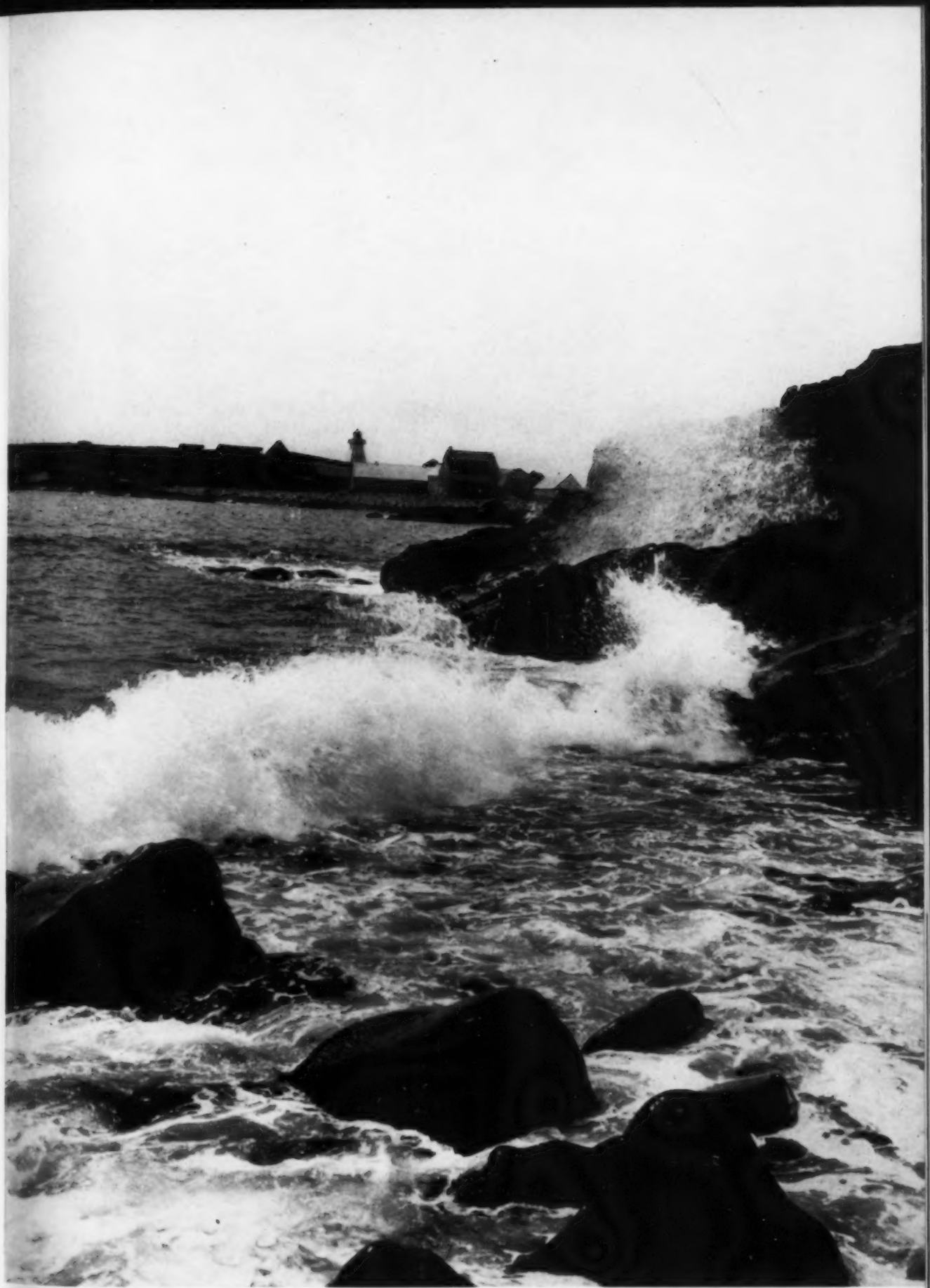
Along the Cabot Trail near Pleasant Bay, Cape Breton Highlands National Park.

Rolling, well-cultivated countryside at Bonshaw, Prince Edward Island.

Picnickers at Brackley Beach on the beautiful seashore of Prince Edward Island National Park.

The Kildare Capes are typical of the red sandstone bluffs found along the north shore of Prince Edward Island.

One of Prince Edward Island's modern paved highways. A fine stretch near Brookfield.



Surf from the Atlantic breaking on the rocks at Neil's Harbour, Cape Breton Island.

Left:—Mary Ann Falls is one of many beauty spots in Cape Breton Highlands National Park. The bridge in the background marks the Cabot Trail.

Above:—A beautiful vista from the Cabot Trail — Looking down the North Aspy Valley towards Cape North and the Atlantic Ocean from Sunrise Lookout.

Below:—Fly-casting on the Eliot River near Bonshaw, Prince Edward Island.

Hauling caliche to the loading platforms.

THE NITRATE INDUSTRY IN CHILE

by **ARTURO BASCUNAN**

THE northern part of Chile, known as the "Nitrate Region," lying between Latitude 19° and 26° S., is a barren stretch of country, utterly lacking in vegetation, with barely a trickle of water in what few watercourses exist, while rain is almost unknown. A chain of rugged and sterile mountains, known as the Cordillera de la Costa or coastal range, runs the whole length of this region at a short distance from the Pacific coast and parallel to it. Its height varies from three to six thousand feet and, on the average, it occupies a belt of land 36 miles wide.

The slopes of this chain, which on the sea side are extremely steep and sheer, dropping almost abruptly into the sea, are much smoother on the land side, where they descend quite gradually to the high plateau known as the Longitudinal Valley. This extremely arid valley exists almost throughout the entire nitrate region between the coastal range and the massif proper of the Andes Mountains. This plateau, for such it really is, varies between 15 and 30 miles in width, and its altitude varies between 2,800 and 4,400 feet above sea level. In places, the valley is interrupted by occasional spurs of the Andes range advancing westward towards the coastal chain. It is in this, the nitrate region that the Andes attain their greatest average height, the lowest passes being found at over 12,000 feet while the peaks reach 16,000 feet and more.

At the foot of the Andes range, the foothills enclose small fertile valleys, watered by mountain torrents and covered with luxuriant vegetation, giving life to small villages which form real oases in this desert region.

On the eastern or internal slopes of the coastal range, at a certain height above the Longitudinal Valley, a belt of saline deposits is found. This runs from north to south throughout the region, and is about 30 miles wide. It contains nitrate of soda, or "Chilean Nitrate;" also common salt, sodium sulphate, borax, aluminium sulphate and other substances.

These deposits are located between two abrupt mountain ranges at a great distance from the coast, in a country completely devoid of vegetation, water or fuel; in a region where the climate is such that the days are of suffocating heat, while the nights are clear and cold, and strong winds blow continually. Under these cir-

Note:—This article and photographs have been furnished by the Consul General of Chile in Montreal. The data for the article was obtained from official publications edited by the Ministry of Foreign Affairs and Commerce.

Left: Blasting caliche in the mine Maria Elena.

cumstances the difficulties of extraction are enormous. It has been necessary for Chileans to create everything in the desert, to establish this industry—build towns, cities and ports; build roads and railways; bring drinking water from hundreds of miles away by pipe-line from the Andean springs; and from other regions not only the machinery and material needed for the work, but also the food and supplies necessary for the existence of human life.

The nitrate region, made up of the provinces of Tarapaca and Antofagasta, at the present time possesses two great artificial harbours at Iquique and Antofagasta, which are large modern cities of considerable commercial importance. Other ports, with open roadsteads, are Tocopilla, Taltal, Pisagua, Caleta Buena and Mejillones.

The railway network in this region is made up of both state and private lines, being composed of a central or longitudinal line which follows the valley, and numerous spurs which feed the ports or link up with the nitrate "oficinas," as the elaborating plants are known. In all, there are 2,100 miles of track serving the nitrate region.

Similar in form to the lay-out of the railway network is the highway system, there being a total of 4,000 miles of good roads.

The "oficinas" or plants where nitrate is extracted from the "caliche" or nitrate-bearing stratum, are located in mid-desert, near the deposits. These oficinas not only possess the necessary machinery and equipment for the elaboration of nitrate, but must also provide the means of life for the thousands of workmen who live in each plant. In this way small towns have sprung up in the desert, around each plant, each with water and lighting services, dwellings and shops, schools, hospitals, police stations, entertainment halls, libraries, etc. To counteract the onerous working conditions in this inhospitable region, the industry has been obliged to make special efforts in the field of social welfare among its workers.

Almost all of the items needed for the maintenance of the plants in this barren northern zone, and the necessities of life for its inhabitants, must be brought from the centre and south of Chile. Owing to the geographical configuration of Chile with a long coast-line, internal trade is carried on almost entirely by sea. The value of goods carried by coastwise shipping to be discharged in the nitrate ports in a normal year amounts to more than 500 million pesos (about $62,500,000 dollars at the old par exchange). The ports in this region in view of their enormous shipments of nitrate, play a major part in the nation's foreign trade. In the years between 1920-1930 these ports shipped more than 50% of the nation's total export, but on the other hand, imports landed at these ports were only 20% of the total for the whole country.

Saltpetre, or nitrate of soda, is found mixed with other saline matter and with some insoluble substances in an earth-crust or mineral ore known as "caliche" which contains nitrate of soda, potash

Loading caliche at the mine.

salts, calcium, magnesium and iodine compounds mixed with gravel and clay. The caliche has a varying proportion of saline contents, physical appearance and colour, according to the location where it is found.

The saline deposits which contain this caliche take several forms, but the most common, and that which is usually worked, is in the form of stratified layers or pockets. They cover large areas of ground which present a much broken or even pulverized appearance, covered with pieces of thin, flat stones or sometimes with big pieces of silica. The surface crust is of varying thickness, generally of great hardness, and below this is found the caliche in the shape of a layer of variable thickness.

The caliche is extracted from the soil by ordinary mining methods. The surface layer of earth is removed by drilling and explosives. Mechanical shovels and drills are used to take out the caliche. A selection is then made of the lumps which are richest in nitrate content, leaving the low content material on one side. These lumps which are usually of large size are transported over narrow-gauge railways to the oficina which sometimes lies at a distance of many miles from the working place. There the caliche lumps are treated, the nitrate, being separated from the insoluble matter and from the other salts, being finally left in a crystalline state for commercial use, rating 95 or more per cent pure.

At the oficina, the blocks or lumps of caliche are thrown into large crushers. Travelling belts and elevators pick up the crushed mineral and carry it to enormous rectangular tanks where it is submitted to the action of boiling water and undergoes the process of lixiviation. In this manner, a muddy looking liquid is obtained which contains large quantities of nitrate in solution. This is run off into other tanks and finally is cooled, and precipitates the nitrate in crystalline form in large flat pans. A final stage remains, that of drying the nitrate which is then ready to be bagged and sent to the market.

Besides nitrate, other by-products are obtained from the treatment of the caliche, the most important being iodine of which Chile exported in 1936-37, 68.53% of the world's sales. This occurs in the mother solution, after the crystallization of the nitrate has taken place in the form of iodate of sodium and it is removed from the solution by acid sulphate of sodium and purified by sublimation. It is then packed in small wooden barrels for commercial use.

Among other by-products obtained in the nitrate industry are perchlorate of potash, sodium sulphate, carbonate of soda and caustic soda. Moreover, experiments are being carried out for the production of boric acid, nitric acid, nitrate and sulphate of potash, iodine salts, potash salts, cyanide of potash, metallic magnesium and many other lines which will permit the development of a great chemical industry founded on the basic nitrate industry.

In its early beginnings, the nitrate industry was a domestic one. It is said that

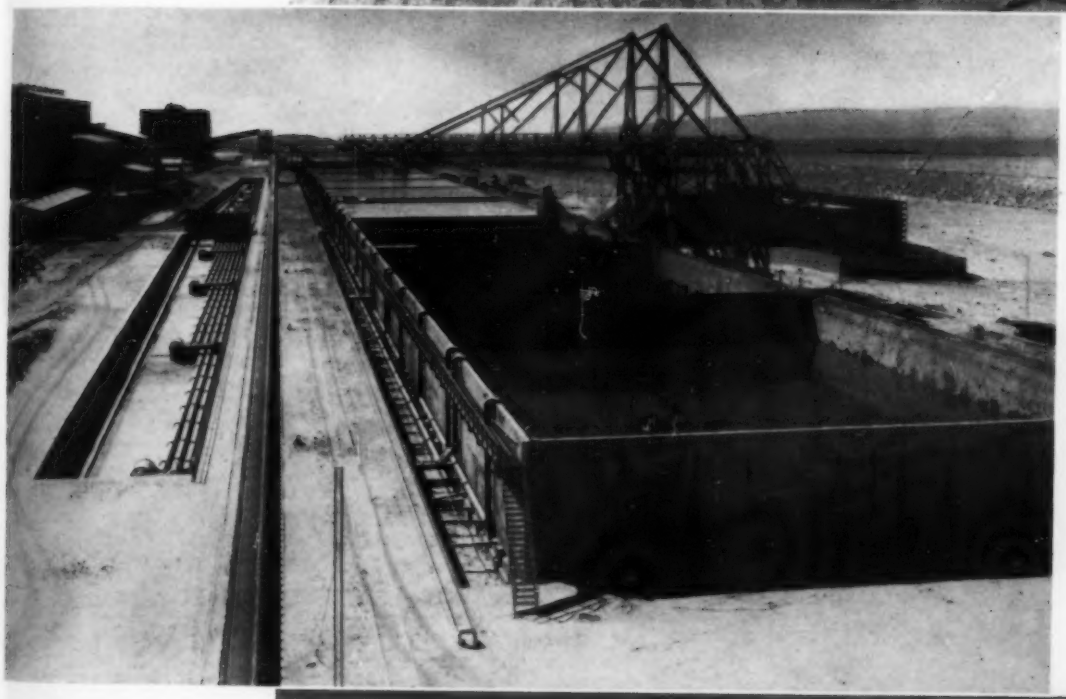
Caliche collected on the pampa by mule carts is brought to trains for transportation to the distant plant.

Caliche in the Mapocho Mine.

Loading bridge, Mine Maria Elena.

Settling tanks, Mapocho plant.

Antofagasta harbour.



Leaching tanks, Plant Pedro de Valdivia.

Iquique, Chile.

the Incas used saltpetre as a manure for their crops before the arrival of the Spaniards who used it for the manufacture of powder during the Colonial era. The real development of the industry began in 1830, when the fertilizing properties of the salt began to be known in Europe and export of the product commenced. However, the commencement of modern methods did not take place until 1878 when the Shank process of lixiviation, then used for the elaboration of potash in Europe, was applied for the first time to the Chilean nitrate industry.

From that time onward, nitrate production went up in ever increasing quantities, year by year, until the outbreak of the Great War. From a total of 250,000 metric tons produced in 1879 production rose gradually to 2,800,000 metric tons in 1913. Since this latter date, production has suffered great variation, reaching 3,200,000 tons in prosperous years and falling to less than a million tons in years of depression. These fluctuations have been due to the influence exercised on world trade by the crisis of the post-war period and also by the competition of nitrogenous artificial fertilizers which are protected by the producing countries by means of subsidies, customs, tariffs, import licences or quotas, monopolies, etc.

Production of nitrate during recent years has been as follows: (Thousands metric tons.)

1900– 1	1,402.1	1928–29	3,280.3
1904– 5	1,729.7	1930–31	1,575.2
1909–10	2,440.8	1931–32	1,067.2
1913–14	2,866.2	1932–33	450.4
1918–19	2,332.6	1933–34	536.000
1921–22	890.0	1934–35	1,135.000
1925–26	2,619.5	1935–36	1,220.000
..	..	1936–37	1,437.519

Since 1884, the nitrate producers have organized several associations or working agreements to avoid mutual competition. At the present time the Nitrate and Iodine Sales Corporation holds an exclusive monopoly of the sale of these products.

For many years, up to the outbreak of the Great War, the export duties levied on nitrate by the State formed from 50 to 60 per cent of the total national revenue.

Since then the policy of the government has been altered by statute 5580 passed in 1935 which provides that the Sales Corporation pays a percentage of the profit to the Treasury to be specially earmarked for the liquidation of the foreign debt.

A considerable increase has been provided also in the nitrate export figures. In the year 1932-33, 269,841 metric tons were exported; in 1933-34, 1,172,017 metric tons; in 1934-35, 1,280,897; in 1935-36, 1,341,162; in 1936-37, the export rose to 1,499,671 metric tons. The exports in 1937 were chiefly to the United States, Egypt, Germany, Italy, France, Holland and Japan.

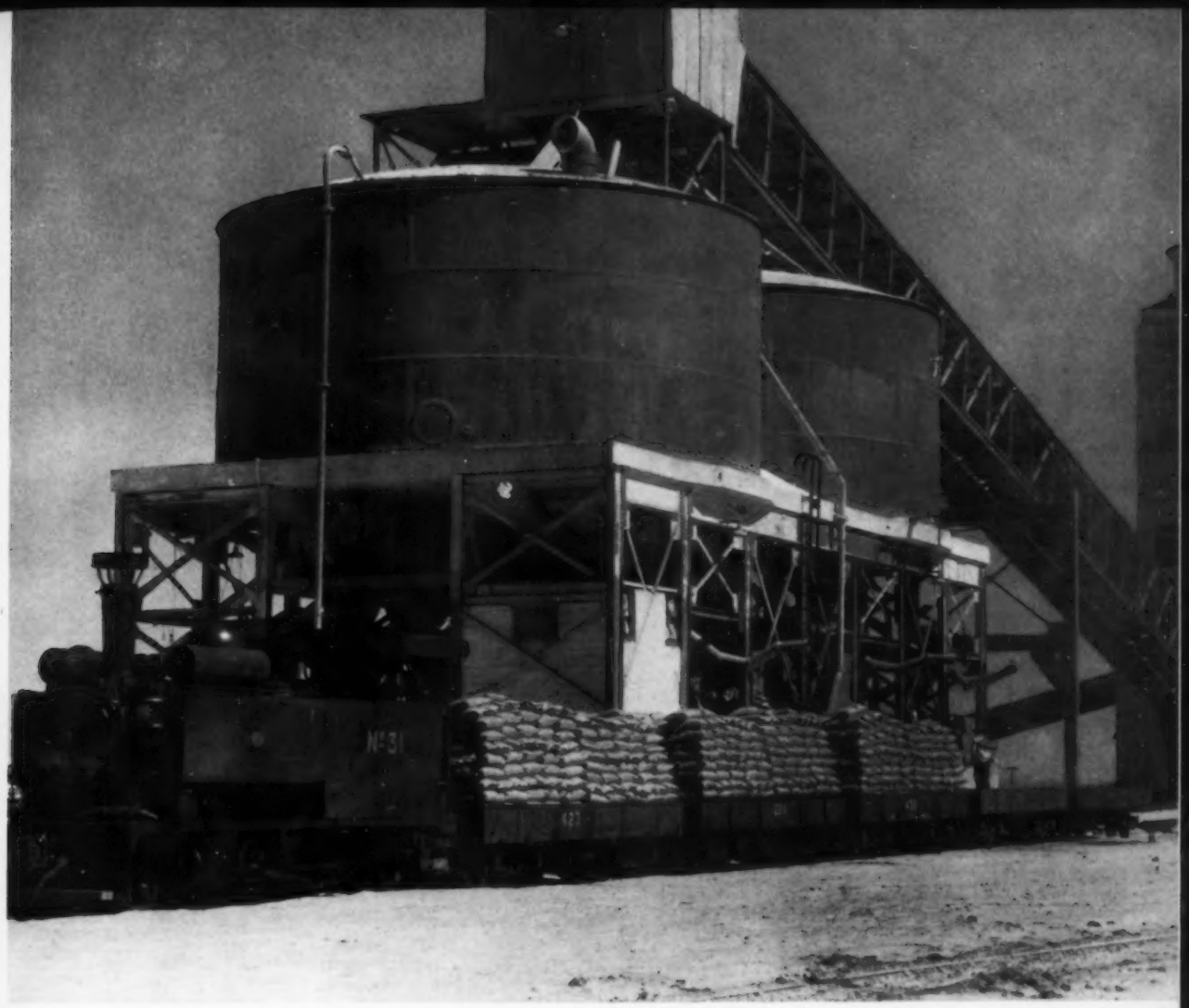
Only a small portion of the immense deposits of nitrate known to exist in the northern region has been exploited. In 1928 it was calculated that there were reserves in sight of 460,000,000 tons of nitrate in caliches bearing more than fifteen per cent of the salt. At the same time there are enormous areas of "pampa" (nitrate desert) which have not been surveyed.

In recent times, the industry has been able to improve its extraction methods so that caliches with a nitrate content of less than eight per cent have been successfully treated, consequently increasing the total reserves available for future working.

Before the Great War, as many as 134 nitrate oficinas were working simultaneously. Since then, the main tendency has been towards the concentration of production in super-plants. There are now 22 oficinas in production, among which are the super-plants "Pedro de Valdivia," which can elaborate 600,000 tons of nitrate per annum, and "Maria Elena," with a capacity of 500,000 tons.

In July 1933, the industry employed 13,500 workmen, this figure being increased to 25,056 by July 1937. These workmen with their families, represent a population of more than 60,000 directly supported from the wages paid by the industry which, at the present time, amount to more than 55,000,000 dollars a year.

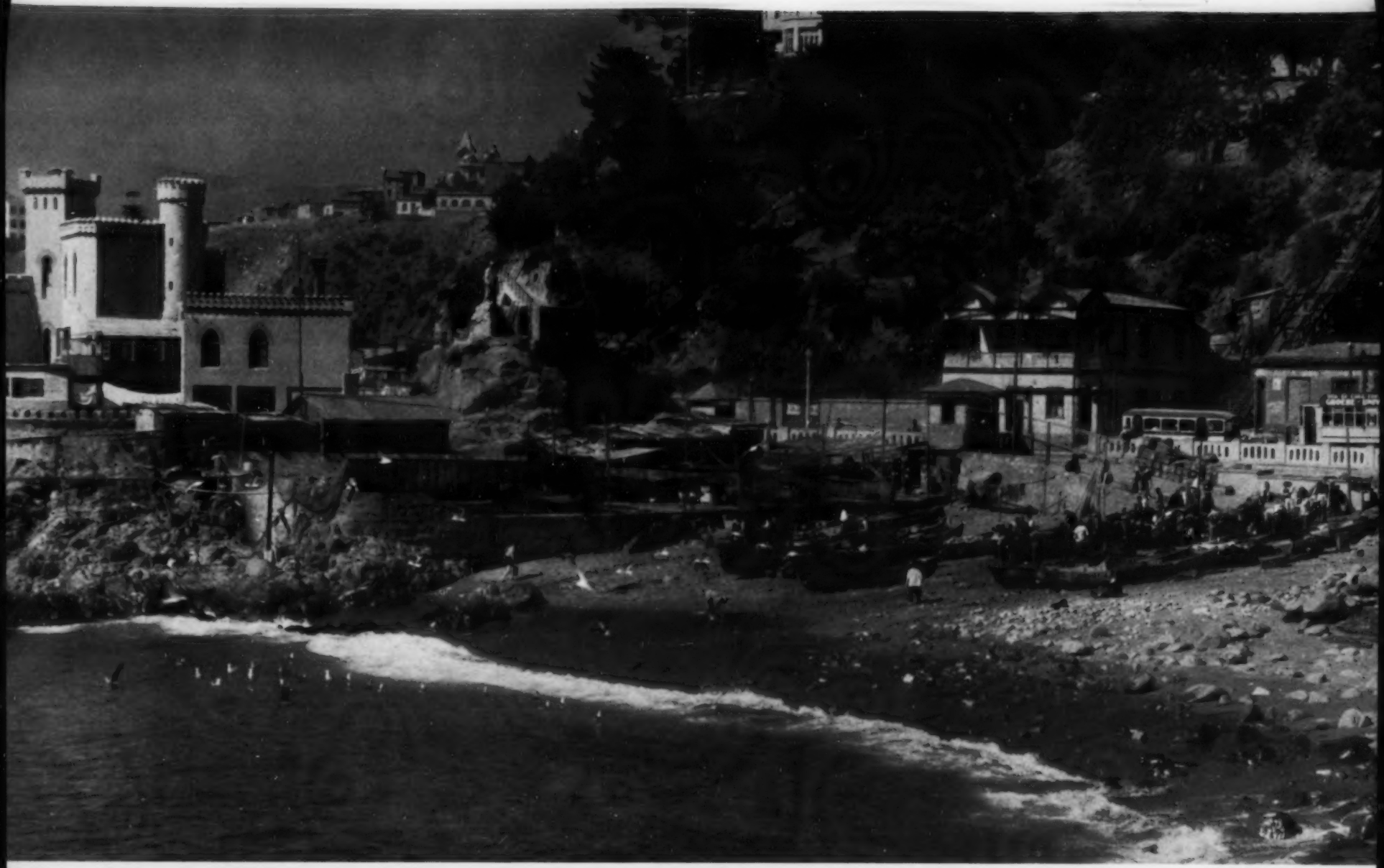
Chilean nitrate contains 15.5 per cent of pure nitrogen, and is characterized by the quantities of iodine it contains, and by other qualities which make it indispensable as a fertilizer for agriculture.



Bagging plant, mine Maria Elena.

Tocopilla is the terminal of the Tocopilla railroad which was built to carry nitrate from the pampas. Here is also located the power house of the Chile Exploration Company which supplies electricity to the copper mine at Chuquicamata 150 miles away in the foothills of the great Andes.

Santiago, Chile.



Valparaiso, Chile. Fishermen's landing beach.

CANADA TALKS BY TELEPHONE

by **FRANCIS T. GILL**

PRESENT day emphasis on scientific research reminds us that one of the outstanding examples of effectual application of research to industry, or more especially to public service, is to be found in the progress of electrical communication. Engineers and scientists, studying in the field of voice transmission over a period of some sixty years, have made available to the people of this Dominion a telephone service that is unsurpassed. It is not by mere chance, therefore, that Canadians use their telephones more than do the people of any other nation.

Only four countries have a greater number of telephones than Canada, and only the United States a larger number of telephones per capita—11.5 per hundred here and 14.4 in the U. S. A. This explains why the business of providing telephone service has become one of this country's largest and most important industries.

About 18,000 Canadians, drawing a total annual payroll of approximately $23,500,000 are required to handle the 6,500,000 local and 75,000 long-distance calls placed in this country on an average day. Many other workers are engaged in associated industries such as the manufacture of telephone equipment.

Apart from providing the means whereby ordinary social and business transactions are completed, telephone service functions as an added link in welding the component parts of the Dominion more closely together. It has brought the Provinces within a few seconds' voice range of Ottawa and, through "Overseas Service", Canada within a few minutes of London and other Empire points. The barriers of distance have been broken down.

Any one speaking in an ordinary tone of voice into a telephone transmitter at Halifax will be heard distinctly over 4,200 miles away in Vancouver. The voice currents will have travelled the all-Canadian route in about one-thirtieth of a second. More than likely the operator will ask the Haligonian to "hold the line", and in less than two minutes he will be inquiring of his Vancouver associate if his golf is any better — or any worse.

Recently a resident of Hamilton, Ontario, was amazed that within three minutes after placing a call to a friend in England the two were in conversation. In this day and age, speed has become a vital factor. Telephone engineers are now trying to clip seconds off the time it takes to establish a connexion, whereas a few years ago it was minutes.

Originated in Brantford

When, in 1874, the telephone idea was first discussed at Brantford, Ontario, during a conversation between Alexander Graham Bell and his father, it is doubtful whether the inventor fully appreciated what a tremendous rôle such a means of communication was destined to play.

The people of that era greeted the announcement of a new method of communication with suspicion, but Bell was determined to overcome the skepticism of his fellow-beings just as he had so recently overcome a serious lung ailment that threatened his very life. It was not until 1876, following the world's first successful demonstration of a one-way long-distance talk from Brantford to Paris, Ontario, that any significance was attached to the invention. Early in 1878 the first telephone switchboard in the British Empire was installed at Hamilton by the late Hugh C. Baker, which enabled any two telephones having connexion with the switchboard to be interconnected. This improvement provided the necessary impetus and the industry started to expand.

The first general telephone agent for Canada was the Rev. Thos. Henderson, a personal friend of the Bells, but strange as it may seem the sale of telephone exchange service was extensively promoted in Canada by the telegraph companies of those

Left:—Research continues uninterrupted in telephone laboratories to provide subscribers with ever better service. Even sample poles are chemically treated to develop one that will effectively withstand the elements.

Switchboards were manipulated by boys in the early days of telephony, and when gas jets illuminated the few exchanges in which they were employed. The operations here portrayed present a distinct contrast to the intricate procedure illustrated on the opposite page.

days. Often two rival concerns would be competing in the same territory, and in order to have adequate telephone service it was necessary to become a subscriber of both companies.

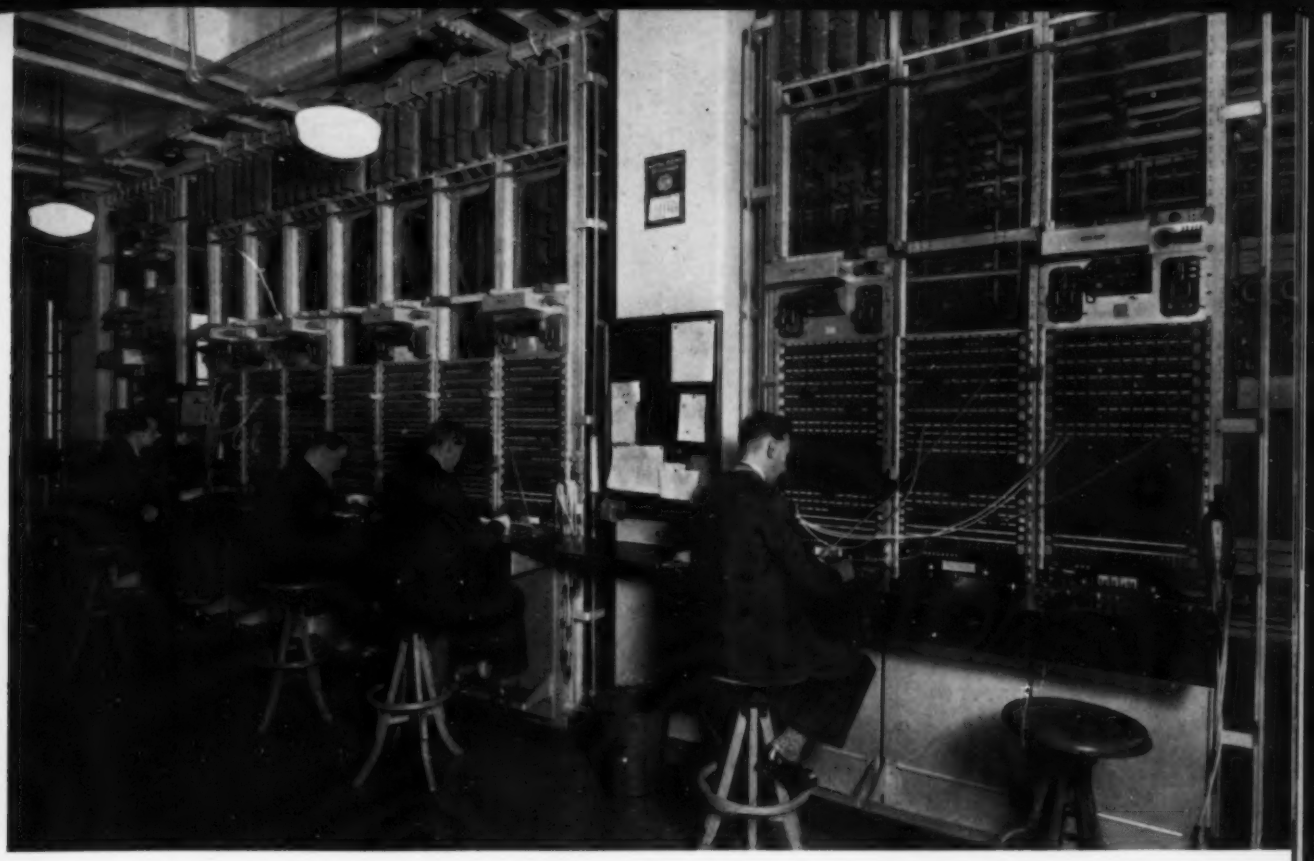
The telephone business was expanding like a crop of mushrooms when the late C. F. Sise came to Canada in 1880 for the express purpose of co-ordinating the telephone interests and of placing the industry on a more stable basis. The Bell Telephone Company of Canada was formed with Mr. Sise as vice-president and managing-director, and one of his first steps was to extend its operations to include all of Canada with the exception of British Columbia. Shortly after the turn of the century, however, it was realized that efficient management could not be exercised over such wide-spread territory, and in the best interests of all concerned the Bell Telephone Company withdrew from the national field to restrict its activities to the provinces of Ontario and Quebec.

Over 3,000 Systems in Canada

Few people realize that to-day there are over 3,000 telephone systems in Canada. The majority, it is true, are small rural companies, but of the 902 in Ontario and Quebec, one, the Northern Telephone Company, operates over 10,000 telephones. Saskatchewan has over 1,000 co-operative companies, and Alberta 419.

The seven major telephone systems in Canada at present are:

	Year Established	No. of Telephones (as at Nov. 30, 1938)
The Maritime Telegraph & Telephone Co.	1911	42,000
The New Brunswick Telephone Co., Ltd.	1889	31,300
The Bell Telephone Co. of Canada	1880	763,000
Manitoba Telephone System	1908	68,400
Saskatchewan Government Telephones	1909	35,100
Alberta Government Telephones	1908	33,000
The British Columbia Telephone Company	1904	122,800



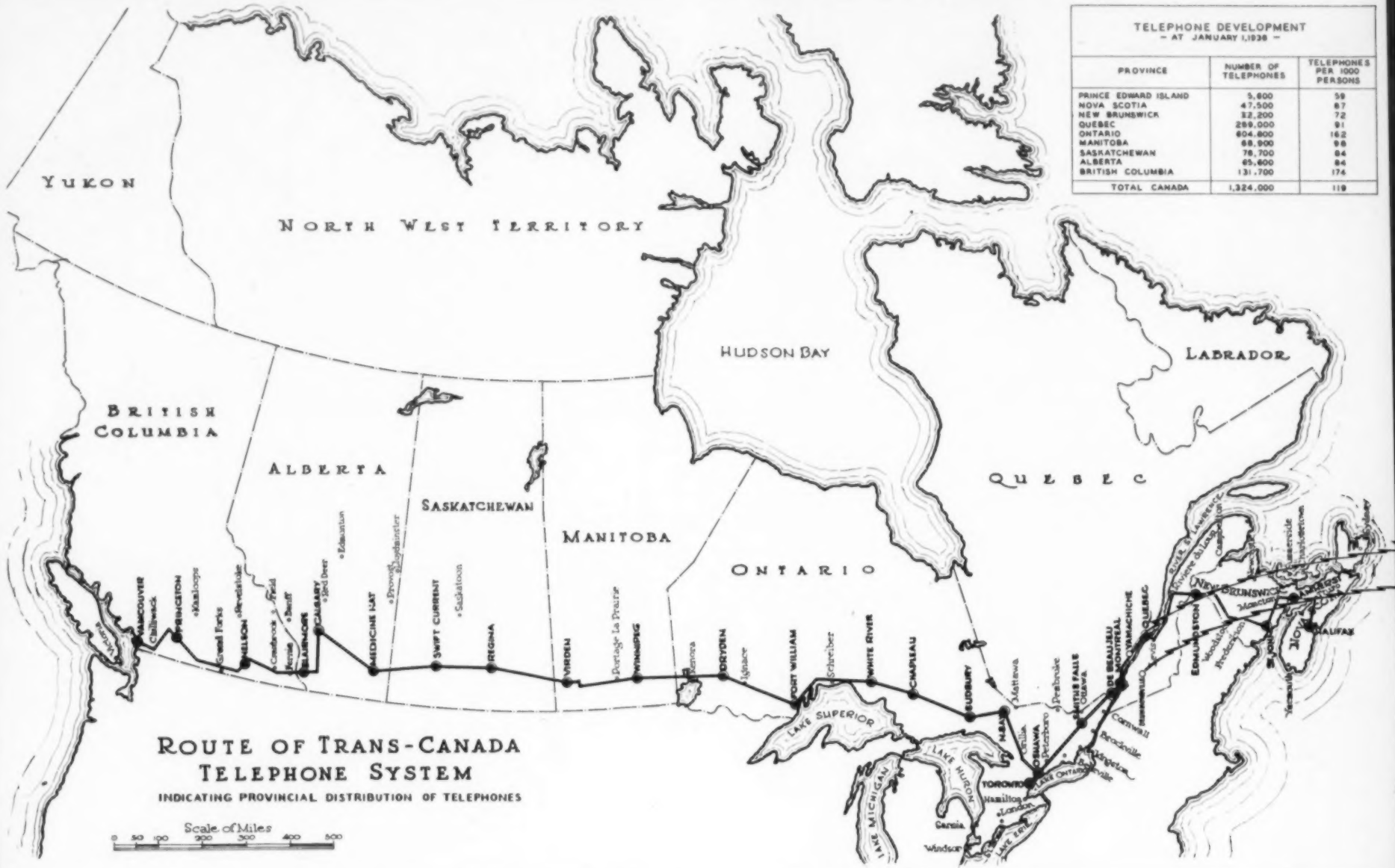
Panels through which trouble on long distance lines, such as "opens", "crosses", "grounds" and "short circuits", are located. The position of any fault can be determined to within a few feet, so delicate is the equipment.

With but few exceptions the telephones of all the various systems in Canada, through a veritable web of local and long-distance lines, have inter-connexion with each other and with those of the United States.

By means of overseas telephone service each one can be connected with any one of some 37,000,000 telephones scattered throughout 78 countries of the world. Russia and New Zealand are the only two major systems having over 100,000 telephones with which service is not available commercially to the Canadian user. Although it has been possible for the last five years to talk to South Africa, India or Australia, each over 14,000 miles away, it was only on January 10 of the current year that telephonic communication was established with Newfoundland, our nearest Empire neighbour.

Ever since 1915 telephone service from coast to coast has been available, but until 1932 only when routed via the U.S.A. The question of providing trans-continental telephone service entirely over Canadian lines was first discussed in 1921, but no important progress was made until after the jubilee broadcast of 1927. Obstacles were many, and the idea of providing lines over the Rockies, around Lake Superior and east of Quebec through New Brunswick and Nova Scotia did not seem an easy task. To an engineer, however, there is no such phrase as 'it can't be done', and each of our seven major systems, mentioned above, agreed to provide the facilities required in its own territory, sharing proportionally the millions involved in the cost of construction. On January 25th, 1932, Lord Bessborough who was then Governor-General of Canada officially opened coast-to-coast telephone service by speaking to the Lieutenant-Governor of each province over the Trans-Canada System.

Circuits on this continent-wide network, over which about 240 calls are placed



ROUTE OF TRANS-CANADA TELEPHONE SYSTEM

INDICATING PROVINCIAL DISTRIBUTION OF TELEPHONES

TELEPHONE DEVELOPMENT
– AT JANUARY 1, 1938 –

PROVINCE	NUMBER OF TELEPHONES	TELEPHONES PER 1000 PERSONS
PRINCE EDWARD ISLAND	5,800	59
NOVA SCOTIA	47,500	87
NEW BRUNSWICK	32,200	72
QUEBEC	269,000	91
ONTARIO	604,800	162
MANITOBA	68,900	98
SASKATCHEWAN	78,700	84
ALBERTA	95,600	84
BRITISH COLUMBIA	131,700	174
TOTAL CANADA	1,324,000	119

on an average day, are so designed that a call from Vancouver to Halifax, or from one main point to another along the way, will require no more than two intermediate "switches". That is to say, the Vancouver operator calls Winnipeg over a direct circuit, the Winnipeg operator connects Vancouver with the Montreal operator over another direct circuit, and she in turn rings Halifax. Improvements in circuit lay-outs are constantly being made. Due to a 2,200-mile circuit between Toronto and Calgary — the longest direct wire voice channel in the British Empire — being placed in service early last year, Saint John, N.B., can now call Calgary with only one "switch", which is made at Toronto.

"Hold The Line, Please"

Probably the greatest improvement in operating methods took place in 1926 when Long Distance introduced "C.L.R." service. C.L.R. means "Combined Line and Recording", or in other words the subscriber is asked 'to hold the line'. Previously, the operator who recorded a call dismissed the speaker and sent the ticket to an outward operator. One then waited uneasily for a period of time in an atmosphere of expectation, and when the telephone rang, the subscriber knew the big moment had arrived and practically tore the receiver off in his excitement. Now the operator who records an order also does the work on the line, and in 92 per cent of all calls connexion is made with the desired telephone without a request being made to hang up.

Transmission on long-distance calls was poor in the early days, and it was the custom for subscribers to stand a few feet away from the old wall telephone so they could shout louder. Often messages had to be relayed by operators at intermediate points. Engineers working in telephone laboratories came to the rescue first with the loading coil and then with the telephone repeater. Loading coils are coils of wire wound on magnetic cores and placed in boxes on the telephone poles a few miles apart. By reducing the loss of energy on the line, they doubled the distance one could talk effectively. Although still used extensively where the telephone wires are encased in cable, the main function of the loading coil has been taken over by the telephone repeater. This device resembles the vacuum-tube amplifiers in a radio set, and its purpose is to strengthen the weakened voice currents, sending them along the wires to their destination with revived power and 'pep'. There are 22 such repeater stations along the Trans-Canada voice paths, as indicated on the adjoining map, so that a Halifax subscriber talking in his normal tone is heard distinctly in Vancouver.

"London Calling"

Before it was possible for one telephone to be connected with any other telephone in the same area, switchboards had to be built. Before it was possible to speak with an associate in the neighbouring town, long-distance lines had to be constructed. Towards the close of 1927 overseas telephone service was made available, placing the millions of telephones across the seas in potential communication with those of Canada. A new era in telephony had arrived. In October of that year, Prime

Switchboard in Montreal through which all "overseas" connexions are made, and conversations in a wide variety of languages pass.

SEVEN MAJOR SYSTEMS MAINTAIN TRANS-CANADA TELEPHONE CIRCUIT, OVER

Above: — Section of mountain route near Rossland, operated by The British Columbia Telephone Company.

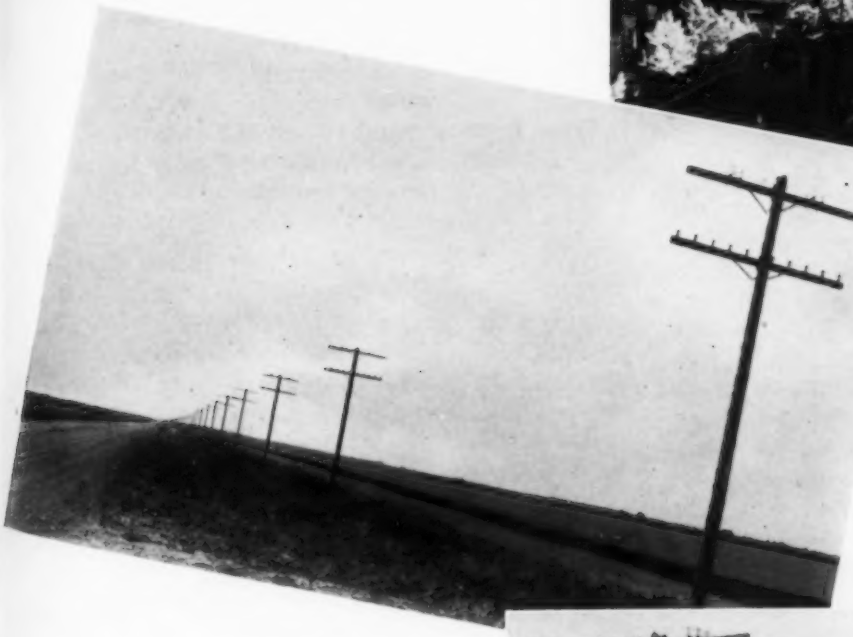
Below: — Alberta Government Telephones maintain line skirting Crows Nest Lake.

Top: — The Maritime Telegraph and Telephone Company handles traffic in Nova Scotia over line bordering Fletcher Lake.

Above: — The New Brunswick Telephone Company, Limited, represented here by wires in the vicinity of Sackville, is an important link in the system.

WHICH DAILY AVERAGE OF TWO HUNDRED AND FORTY 'PHONE CALLS ARE PLACED

Above: — Head office in Montreal of The Bell Telephone Company of Canada, with exchange at right through which transatlantic calls are handled. (Empire flying boat Caledonia circles building on arrival from England).



Lines of the Manitoba Telephone System (above) and the Saskatchewan Government Telephones (right) extend across the prairies, providing a connexion between Halifax and Vancouver, 4,200 miles away.

Cable, manufactured in Montreal, on the final stage of its journey up a Rocky Mountain trail in British Columbia.

Minister W. L. Mackenzie King inaugurated the service between Canada and Great Britain via New York, when he exchanged greetings with Prime Minister Stanley Baldwin in London.

The need for an all-British route designed to avoid the detour through the United States was soon appreciated, and on an agreement being reached between the Bell Telephone Company of Canada, the Canadian Marconi Company and the British Post Office, such a channel was provided and officially opened in July, 1932, in time for the Imperial Economic Conference which was convened in Ottawa towards the end of that month.

It is not necessary to talk any louder on a call to Australia than when an order for household supplies is placed with the nearest grocer. And, because the voice goes out over the air on overseas calls, one should not imagine that it can be overheard by any one with a short-wave radio receiving set. All messages are "scrambled," which is the way telephone people express what happens to the voice. The messages pass through a device which literally turns the voice into unintelligible gibberish. Then at the other end, after it has been transferred to land wires, it is "unscrambled" so that the listener hears only the normal speech.

Completing an overseas telephone call often involves several languages. A call to Rumania from Edmonton, for example, travels to Montreal and over to London in English. London passes it to Budapest in German, and Budapest relays it to Bucharest also in German. The Bucharest operator completes the connexion with her subscriber in Rumanian.

The following story illustrates to what extent the telephone has contributed towards making all nations neighbours. The mayor of San Francisco recently received a telephone call from the London Daily Mirror. "Tell us about the fire on your water-front," said the Londoner. "It's news to me" replied the mayor, "but I'll check up." He did and learned of a $200,000 blaze!

The advantages of overseas telephone service have been realized by more people each year, and during 1937 more than 3,000 such conversations took place. This marked a 57 per cent increase over the previous year, due in large part to better business conditions prevailing at the time, and also to many Canadians being in London for the Coronation ceremonies.

Two-Voice Routes

The technical operations by which such conversations are made possible are a triumph of engineering effort which Canadians should not fail to appreciate. In non-technical terms, the procedure may be explained as follows:

Suppose, for example, that Mr. Brown in Calgary wishes to speak with Mr. Smith in Liverpool, England. Brown calls his long-distance operator in Calgary. The long-distance operator at once gives the call to an operator in Montreal, known as the "overseas operator", who handles the Canadian end of all transatlantic calls, whether they originate in Calgary, Montreal, or at other points. The "overseas operator" takes over the call, completes the connexion with Liverpool through a similar operator in London, England, and Brown and Smith begin to talk. Here is the route their voices travel:

Snow facilitates travel over rough terrain between Chicoutimi and Baie St. Paul, Quebec, while chaining a pole line.

Courtesy of T. C. Thompson.

Brown's voice travels from Calgary through Montreal to Drummondville, Quebec, over the ordinary long-distance line of the Trans-Canada System. Here his voice is taken over by the Canadian Marconi Company, and from the great aerials at Drummondville it is hurled across the Atlantic to receiving aerials at Baldock, England, about 20 miles from London. There it is taken over by a long-distance telephone line, carried to the "overseas operator" in London and thence to Smith's ear at Liverpool.

Smith's voice coming back travels from Liverpool by long-distance land line through the "overseas operator" in London to Rugby, where there is a transmitting station similar to the one at Drummondville. From Rugby, Smith's voice is flashed over the Atlantic and picked up by the Canadian Marconi receiving aerials at Yamachiche, Quebec. At Yamachiche, the Canadian Marconi Company hands Smith's voice over to the Bell Telephone Company of Canada and it then travels by long-distance line, through the "overseas operator" in Montreal to Brown's ear in Calgary.

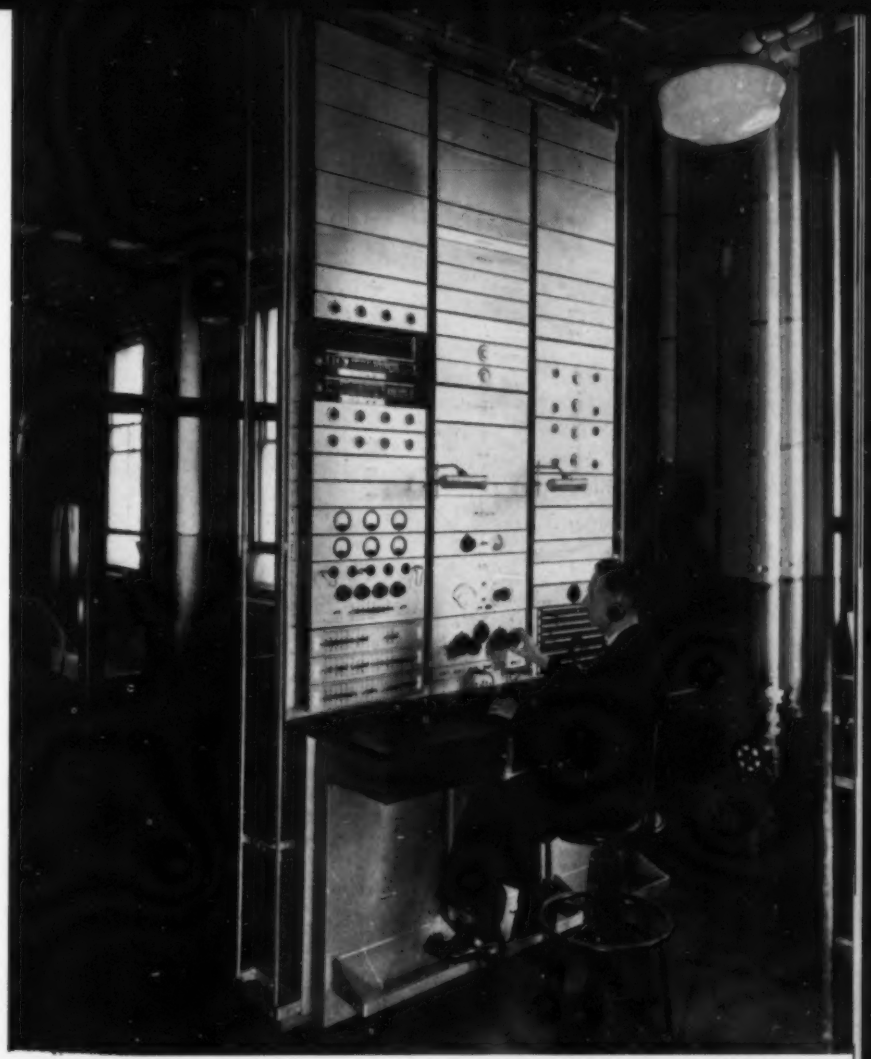
All this complicated routing of voice makes no difference to Brown in Calgary and Smith in Liverpool. So far as they are concerned, their conversation is as instantaneous as though they were in the same room, for their voices travel at a speed of 160,000 miles per second. That is, Brown's voice goes from Calgary to Liverpool and Smith's voice comes back in about one-fifteenth part of a second. In one second, Brown's voice could travel over six times around the earth.

"*The Voice with a Smile*"

To the public, the operator still typifies the telephone system, and a visit to the operating room of a central office, where "the voice with a smile" predominates, is an interesting event at any time. The visitor will be surprised at the lack of noise and the speed and precision with which the operators work. Some hours of the day are busier than others, notably between 10 and 11 in the morning and 7 and 8 at night. To handle this increased traffic, the operating staffs are increased. Providing service for 24 hours a day, every day, requires a great deal of study. That is why in some exchanges every local call handled by an operator is counted, so that a record of the traffic is kept for future planning. Long-distance operators dislike being tagged with the "get their man" motto, but they do try to complete all calls. Not long ago an Ottawa employee was going off duty early one morning when she was accosted in the hallway by a picturesque band of gypsies. One of the group produced a $50 bill and said "I want to call Long Distance." She was referred to the nearest public telephone booth. Soon afterwards, the long-distance operator received a call for a "Mr. Bercovitz — a gypsy living over a shoe store on Yonge Street, Toronto." No street number was available and he did not have a telephone. It was, however, "a death call", as the gypsy expressed it. The calling party gave only one clue — "that any gypsy in Toronto could locate him and that some of them lived on Queen, Yonge and York Streets in that city." The operator decided to call the Toronto police department for assistance. Mr. Bercovitz was located and the call completed.

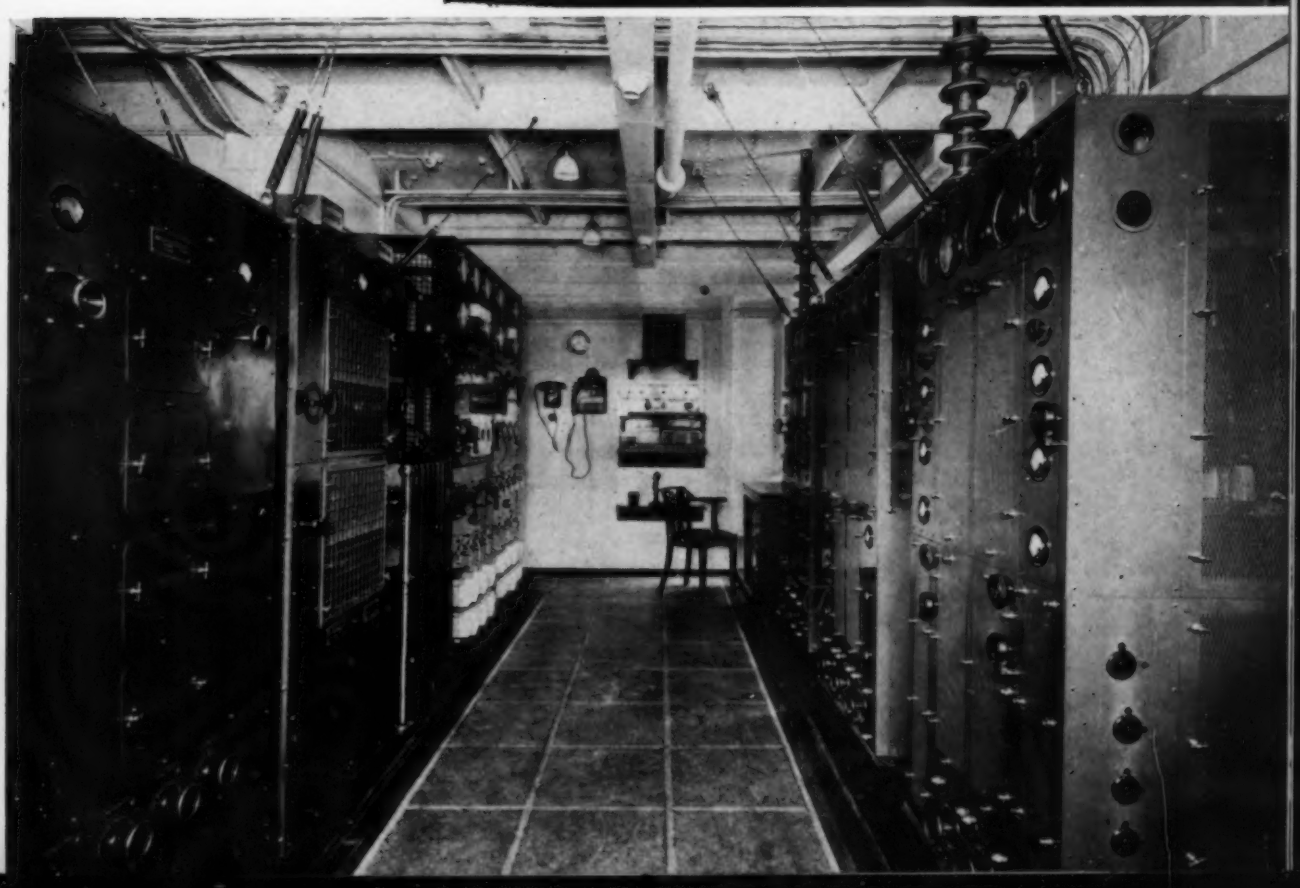
Left: — Terminal control equipment on the circuit inaugurated on January 10 between Montreal and St. John's, Nfld. Voice echoes are here eliminated, and a "speech inverter" renders conversation unintelligible to any owner of radio equipment attempting to listen in.

Below: — Wireless transmission equipment of the Canadian Marconi Company at Drummondville, Que., from which voice currents originating in Canada are projected through space to Newfoundland, across the Atlantic and to a limited number of ships at sea. The receiving station is situated at Yamachiche, about forty miles away on the north shore of the St. Lawrence River.



Right: — "Vodas" equipment recently installed in the Montreal toll exchange for the further improvement of "overseas" communication.

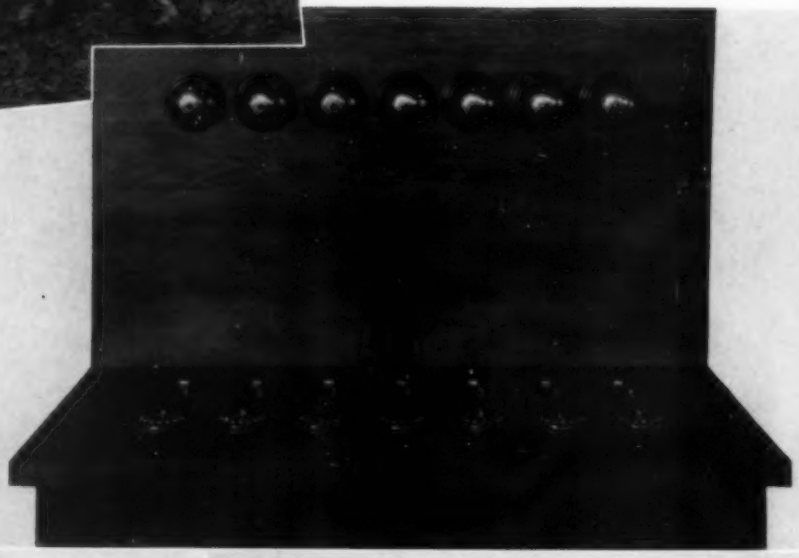
Below: — Radio room in the Canadian Pacific liner Empress of Britain, from which passengers may converse by telephone with friends ashore, even though she may be half around the globe on her annual world cruise.



Left: — Alexander Graham Bell, inventor of the telephone, photographed in 1906 with E. McIntyre and Thomas Brooks. These three laid in 1876 the first telephone line in Canada — six hundred yards of stove pipe wire — from the Bell homestead at Brantford, Ont., to the Mount Pleasant Telegraph line.

Centre: — Replica of first telephone switchboard in the British Empire, established in Hamilton, Ont., in 1878.

Bottom: — Patrol waggon travels at high speed with repair gang in early days of telephony.



Below — First hand telephone set.

It has often been said that the telephone is not appreciated until some emergency arises. In a crisis, such as a flood or a fire, it has become almost a tradition that the operator remains at her post until ordered away. Even then she sometimes refuses to leave. Many meritorious cases have come to light where a subscriber, overcome by gas fumes or illness, has just managed to struggle to the telephone and call for help. The operator has had the call traced, summoned help, and saved a life.

Guarding the Service

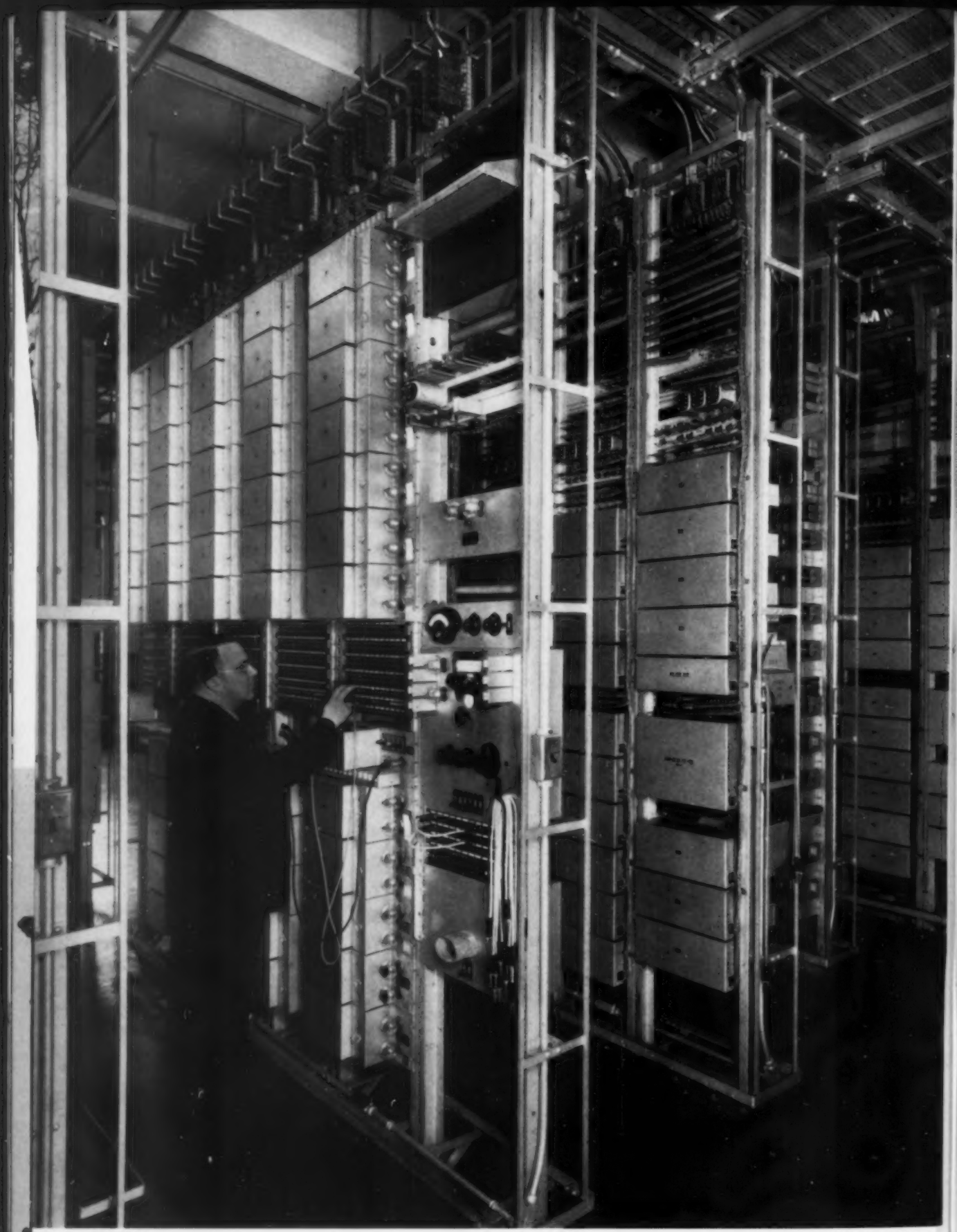
In days gone by a telephone was frequently out of order and often for days at a time. Not so to-day. Due to better equipment and improved maintenance practices, troubles reported average only about one per telephone per year, and repairs are made with all possible speed. "Trouble shooters" are employed who are continually making tests to prevent potential breaks. One should not be surprised if some day a telephone man is seen spreading soap suds on a cable. He is not trying to wash it, but is looking for bubbles which signify a leak, for cable leaks are "headaches" to telephone companies. To combat them, nitrogen gas is forced into the cable under pressure in various sections. Then, should a squirrel sharpen his teeth on the lead sheath, or a hunter's stray bullet cause a puncture, the escaping gas prevents moisture seeping in, and the lowered pressure rings an alarm in the nearest telephone office.

A carrier system is important to a telephone company because it makes possible several conversations at the same time over the same pair of wires. With only one radio set, it is possible to receive programmes from various broadcasting stations. That is because each station operates on a different wave length. A carrier system functions in the same way. Between Montreal and Saint John, N.B., for example, there are two pairs of wires which normally would allow two conversations to take place, one over each pair. On each pair of wires a carrier system providing three additional voice channels is imposed so that eight talking channels are available. Five are used to provide direct circuits between Saint John and Montreal, while the remaining three are utilized to provide Halifax-Montreal circuits.

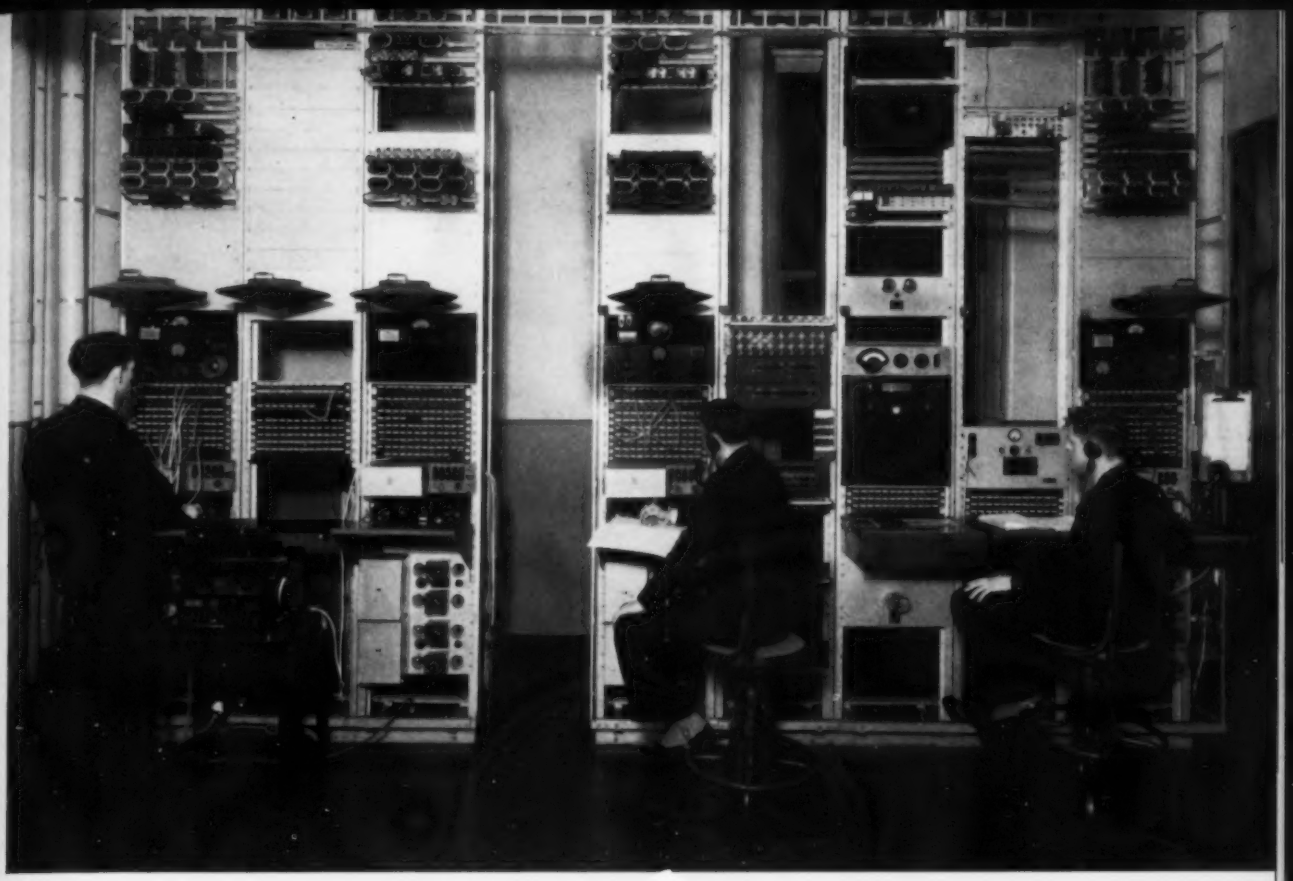
In the ordinary type of modern dial cradle telephones there are 287 parts, most of which have to be assembled by hand. If no dial is involved, about 100 fewer parts are required.

Materials used in the manufacture of the telephone are drawn from practically all parts of the globe. Copper, zinc, lead, nickel, platinum, silver and gold are obtained in Canada. Coal comes from mines in Canada and the U.S.A., iron ore from Newfoundland and the United States, asphalt from Trinidad, bauxite for the production of aluminum from British Guiana, mica and shellac from India,

Trouble, in the olden days, when all wires were suspended between poles and, when ice-encrusted, presented a beautiful but fearful appearance to telephone authorities.



Repeater panels in the long distance telephone exchange at Montreal.



Orchestral and other radio programmes originating in the United States or Canada pass through such control centres before being broadcast over one or more stations in either country. At the left may be seen a teletypewriter, by which written messages, news items, stock quotations, etc., are transferred to one or more distant offices.

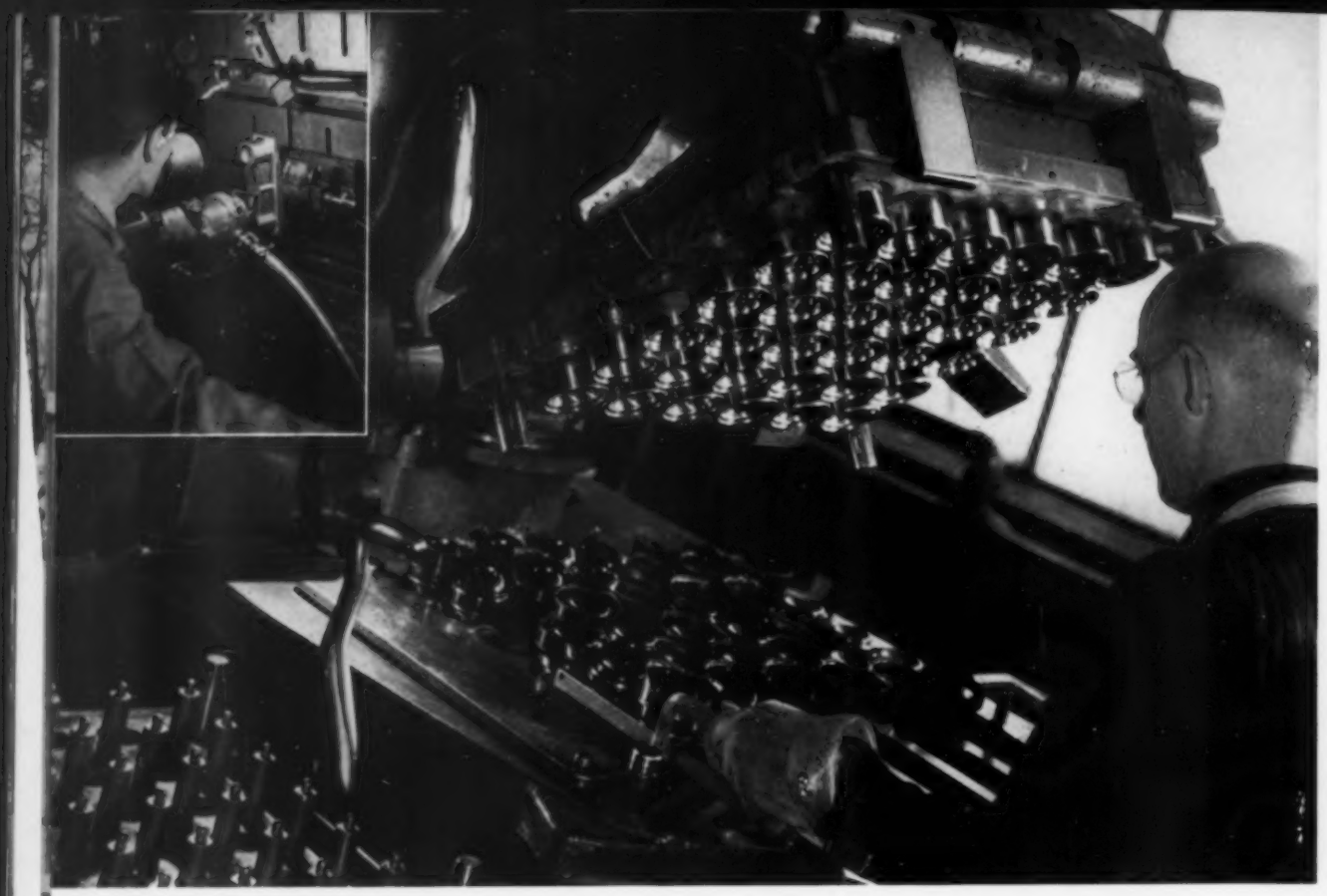
while rubber and tin are contributed by Malaya. Eire (Ireland) supplies us with flax, Egypt with cotton, and Australia and New Zealand with wool. Silk comes from Japan.

What seemed marvellous only yesterday is regarded as commonplace to-day. The teletypewriter, sound pictures, telephotography (sending pictures over wires) are all by-products of telephone laboratories, to say nothing of radio and television.

Those engaged in telephone research have contributed much to the alleviation of human suffering. Aids for the deaf have been produced. The artificial larynx enables a person who has lost the power of speech, due to a breakdown of the vocal organs, to talk again. Surgery has been given the electrical probe and the electrical stethoscope. Bell little knew what he started when he gave the world the telephone.

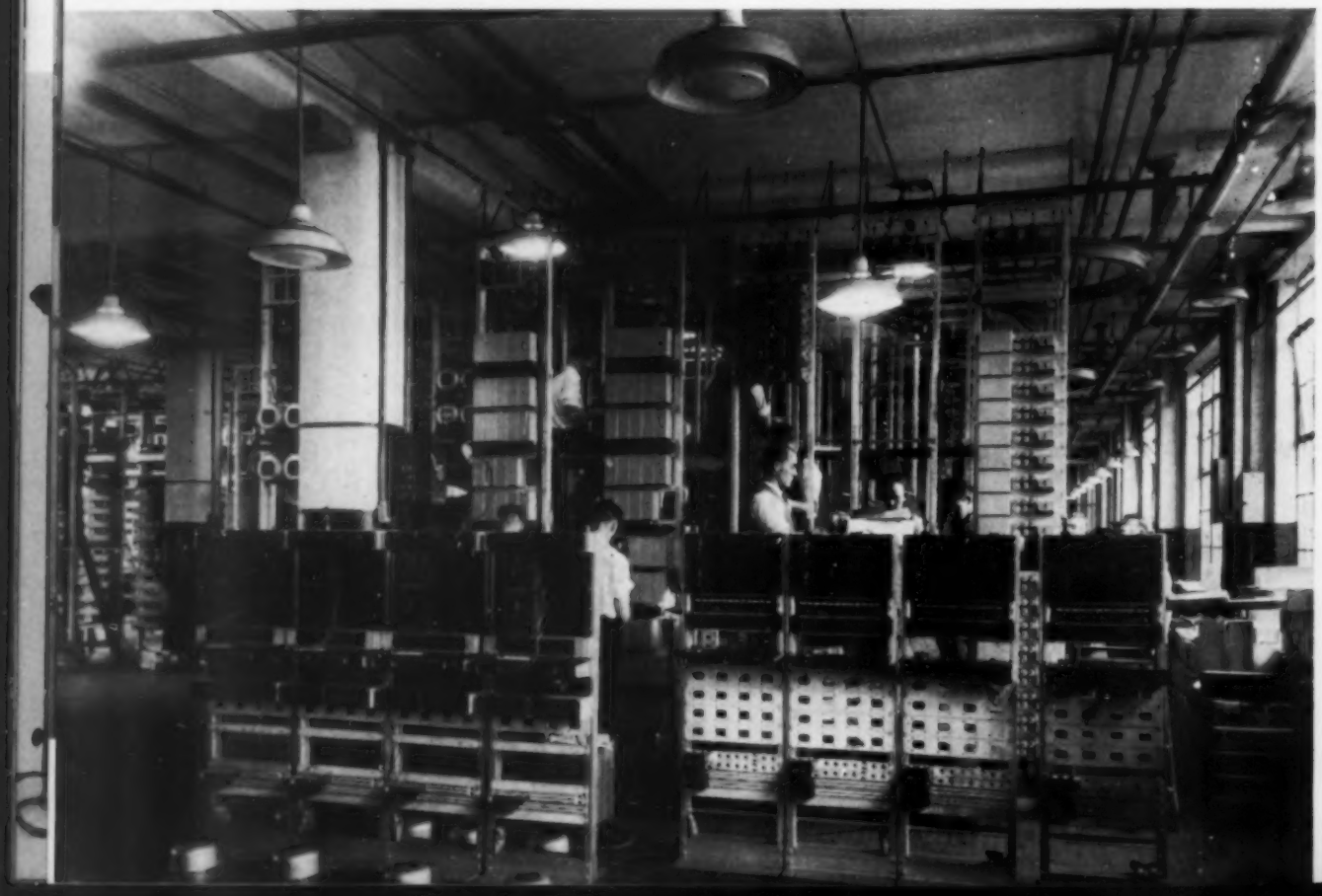
On August 2, 1922, Alexander Graham Bell, having lived as full and useful a life as any man could wish for, passed away in Baddeck, Nova Scotia, at the age of 75.

The telephone, which was invented, developed and improved to its present state of efficiency during the space of a normal lifetime, remains to-day as a memorial to a great and wonderful man.



Moulding plastic material in the production of mouthpiece and earpiece units of modern handset telephones.
(Insert) Manufacturing the moulds, which involves much technical care.

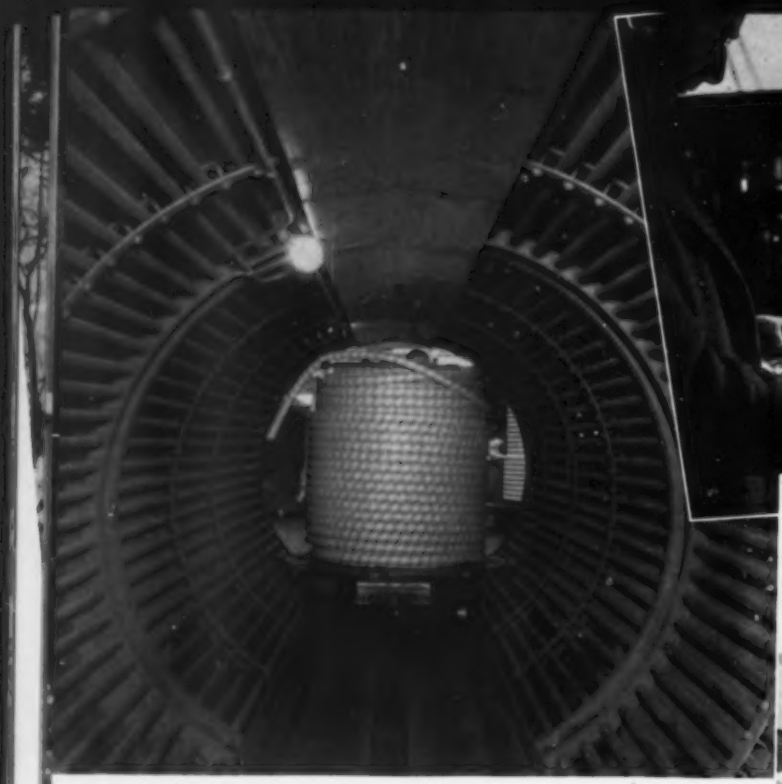
Final assembly in Montreal of long distance telephone equipment previous to shipment.
Photos by Northern Electric Co., Ltd.

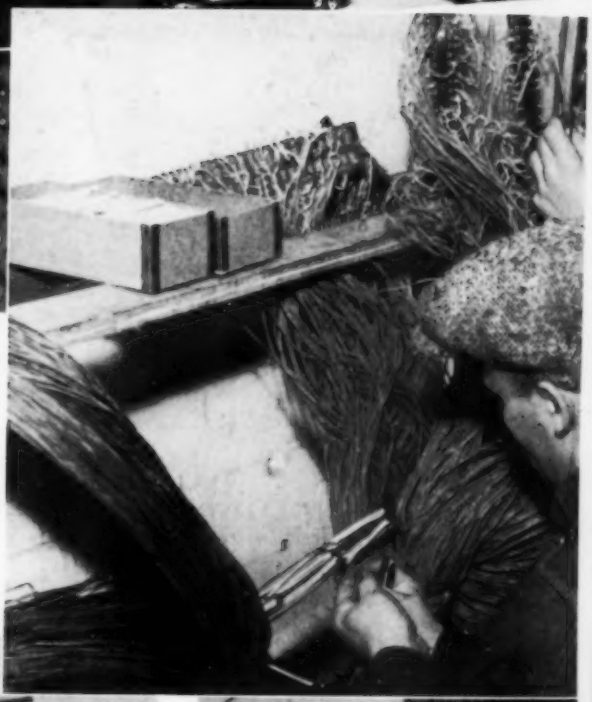


Testing dial telephone system switches before delivery to exchanges throughout Canada.

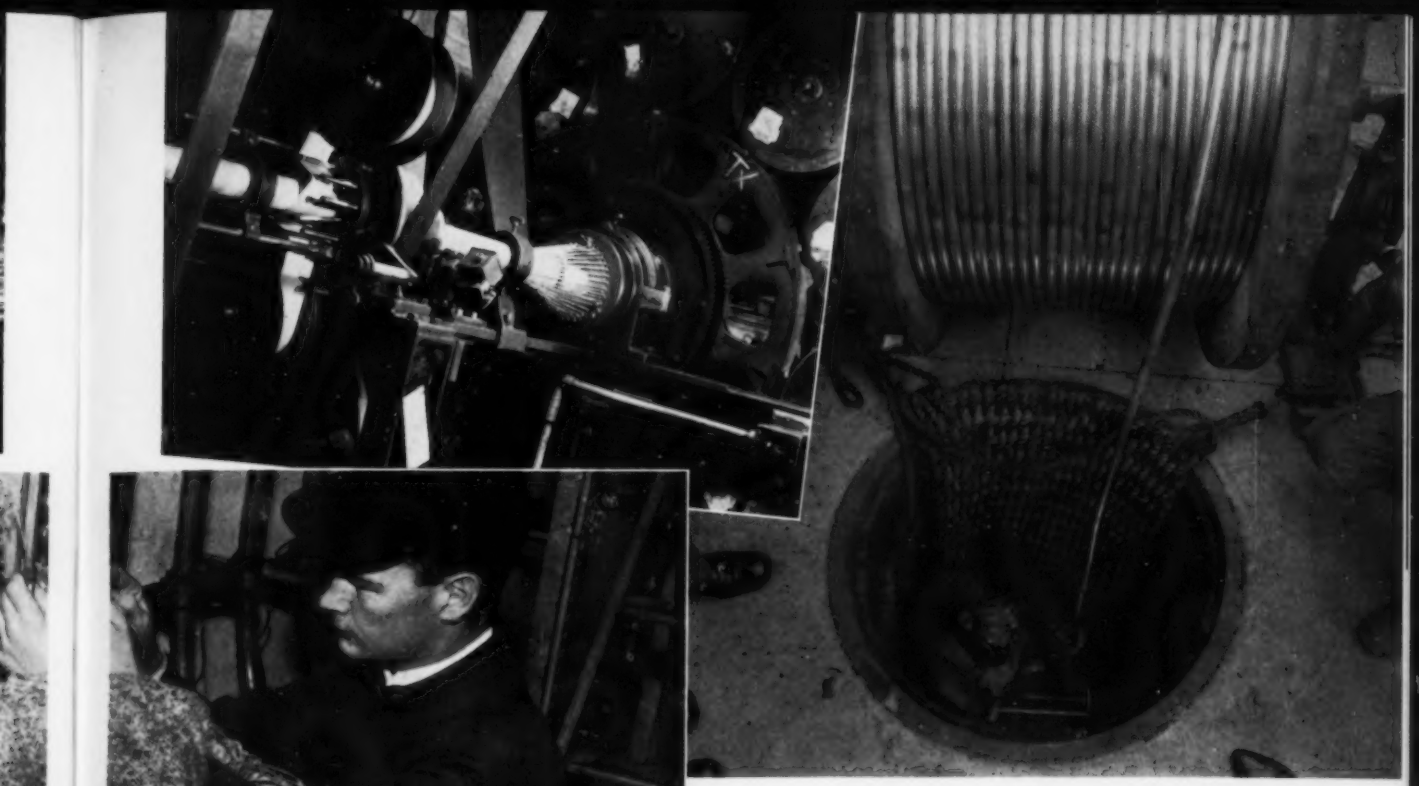
Single deck braiders, which cover telephone cord with a coat of silk or cotton, providing protection and a pleasing appearance. (Insert) Section of main distribution frame in a Toronto dial exchange.

Photos by Northern Electric Co., Ltd.





Above:—Vacuum drying oven, in which moisture is removed from telephone cable. Top right:—Testing insulating compound for consistency. Right:—Splicing wires in underground cable. Below:—Tractor and plow for laying telephone cable.



Above:—Telephone cable being drawn into conduit. Top left:—Final stages in winding 1800 pair telephone cable, showing last layer of wires and outside paper covering. Bottom centre:—Splicing wires in overhead cable. Below:—Laying telephone cable in trench.

Fishing weirs are a common sight on the banks of the St. Lawrence River. They are erected during July and August especially for the eel season and are taken down in November. The above weir averages ten thousand pounds of eels per season.

The eels shown in this storage tank are of the silver belly type and weigh an average of four pounds each. This variety is a favourite on the German market.

Pushcarts or small waggons are used to haul the eels from the storage tanks when a sufficient quantity has accumulated, usually around six or seven hundred pounds.

EEL FISHING IN QUEBEC

by **EDWARD P. LABERGE**

OF all the many varieties of fish known to mankind, none have been more subject to prejudice and superstition than the eel. Aristotle is credited with having said that eels have no sex, lay no eggs, but were the off-spring of the god Jupiter. Some one else started the rumour which still persists to-day, that they grew from bits of hair dropped in the water.

The birth-place of this strange fish has been a puzzling problem for many generations, and was finally elucidated by Dr. Johannes Schmidt, a distinguished Danish Professor, who spent twenty years studying the whereabouts of eels all over Europe and America. Dr. Schmidt finally established the fact, beyond doubt, that all eels originate in the Sargasso Sea. They hatch there, and their larvae come to the surface of the sea among the floating grasses. They are then cigar-shaped and transparent. The larva turns into an elver, which is larger but still transparent. They finally take the shape which they are to keep throughout their lives and lose their transparency as they approach the mouths of our rivers. They also separate upon reaching this point. The male eels, which never attain more than one to two pounds in weight, remain in salt water at the mouths of the rivers, whereas the female eels continue up-stream and spend at least four years of their lives in fresh water streams, lakes and ponds. They sometimes even manage to crawl overland into land-locked ponds.

Niagara Falls, however, is their ultimate barrier, and according to Professor Baird, the visitor who enters under the sheet of water, at the foot of the falls, in the spring and summer, will be astonished at the enormous number of young eels crawling over the slippery rocks and squirming in the seething whirlpool.

Female eels, therefore, attain their maturity in fresh water. When this stage is reached, the return journey to the sea begins. They swim down-stream, shooting rapids and falls, crawling over rocks, dams and even land, if necessary. They congregate at the mouths of streams and rivers, in ever-increasing numbers as they approach the larger rivers and finally the sea. They meet their mates in salt water and together they pursue their race to love and to death, as Claude Melançon says so picturesquely in his book entitled "Les Poissons de Nos Eaux." When reaching the Sargasso Sea, the female eel plunges to its great depths, where the terrific pressure forces the eggs out, and they are fertilized by the male eels when they reach the warm surface of the Sargasso Sea. The female eel then dies.

The St. Lawrence River, with its numerous tributaries, carries each year millions of female eels on their way to the Sargasso Sea. They pass through the St. Lawrence bottle-neck, opposite the Island of Orleans, in tremendous numbers during the months of September and October of each year. At this point, they are trapped by crafty fishermen who derive annually a substantial income from this industry.

The Huron Indians, who were placed on the Island of Orleans for protection against their enemies, the Mohawks, first noticed the regular seaward traffic of eels. They taught the French settlers the art of weir fishing, and, from father to son, this industry has persisted for over three hundred years in the province of Quebec. At the present time, Germany imports the largest quantity of eels, for consumption. German importers came to Canada before the War and realized the possibilities of an important business. This trade was discontinued during the War, but regained its activity immediately after. The years 1928, 1929 and 1930 each saw over one million and a quarter pounds of eels exported to Germany from the ports of Montreal, Quebec, and New York. The recent German regulations concerning foreign exchange made trading rather difficult, but, in spite of obstacles, the eel shippers of Quebec, and particularly the newly formed Co-operative Society of Eel Fishermen of the Island of Orleans, have just completed a very successful year.

The eel fishermen of the Island of Orleans and the north and south shores of the St. Lawrence River, close to Quebec

Slippery as an eel! Eels are also endowed with unusual strength and endurance This big fellow gave Mr. Mercier, a director of the Co-operative Society, a real battle.

The pans are carried into the freezing room where they are placed over brine coils. The temperature ranges between 8 and 10 degrees below zero and from 2 to 4 hours are required to freeze the eels into a solid block.

Glazing protects the frozen eels from loss of fat by evaporation. After being removed from the pans they are dipped in water and left in the cold room where the congealed water forms a protective coat of ice of one-sixteenth to one-eighth inch in thickness.

The several cold storage plants in the city of Quebec receive over a million pounds of eels each fall. This plant belongs to the National Harbours Board and gives the fishermen a good service.

The first operation is that of panning. The eels are placed in galvanized iron pans in a head-to-tail position from which they will emerge in a solid block, compact and easy to handle.

Eels are packed in sturdy boxes for export. The gross weight is about 120 pounds. The boxes are bound and stencilled in cold storage where they will remain until shipment in refrigerated boats or freight cars.

City, are mostly farmers who devote the latter part of the summer and fall to this industry. There are close to 220 licenses issued by the Department of Game and Fisheries to eel fishermen in the province of Quebec. A license entitles the holder to erect a weir on a limited section of the shore line. These licenses are issued to bona fide proprietors, who may, in turn, sell this right to other fishermen. It is customary for a father, to include his fishing rights in his legacy to his son.

The fishermen build their weirs on the shore, during their spare moments or on rainy days in July and August, and wait for the opportune moment to drag or float them out. They usually choose the period of the full moon, when the tide rises to its highest point and also recedes the farthest. When the weirs have been taken out to a point where they may be safely anchored and yet, at the same time, retain a sufficient amount of moisture to keep the eels alive, at low tide, they are weighted down with large rocks or boulders. This precaution is not superfluous as weirs are often subject to severe pounding from the tides, storms and waves caused by ocean liners travelling up or down the St. Lawrence River. A beacon is also attached to the weir, as a warning to coast-wise navigation at high tide.

At their best, eel weirs are elaborate contraptions. Each fisherman has a design of his own which is often dictated by the topography of the shore. Generally speaking, they are divided into three parts, namely:—the barrier, or approach; the cage, which is the most important part; and the storage tank. The barrier is a series of posts to which is attached wire netting. It resembles a very high fence extending from the high water mark to the mouth of the cage, which is "V" shaped. The eels follow the current, that alternates up and down, according to the tides. They strike this fence which they cannot pass, but their instinct urges them on, and they attempt to go around the obstacle. When reaching this "V" shaped entrance, they enter innocently in the cage from which they never emerge. It is interesting to note that the eels are trapped from both sides of the fence. The entrance of the cage is double, and thus, the alternating currents caused by the flow and ebb tides, each bring their harvest of eels.

The cage is a rectangular or square box, entirely covered with wire netting of the same gauge as used for the barrier. This wire netting is one-sixteenth inch in thickness, and the loop-holes are one inch in diameter. The netting is usually made of galvanized iron to prevent corrosion and allows a longer life for the weir. The size of the cage depends largely on local conditions. Thus the depth of the water, tides and exposure are factors which determine its size and shape. Some are as high as twenty-four feet while others barely reach ten feet. They have boarded floors and hinged doors, to allow the fishermen to enter and handle the eels. The storage tank is completely boarded and usually is located in an outside corner of the cage. The tanks hold various amounts of eels, but usually enough to make up one good load for transportation to the cold storage plant in Quebec City. These tanks are reinforced with steel bars, in order to resist the pressure of the eels inside and also to safeguard this valuable product, in case of accident to the weir.

Weirs are visited twice daily during the fishing season, and this becomes a very important routine for the fishermen, because eels travel in schools, and very large quantities may be trapped at one time, requiring immediate attention. There is no definite period for this traffic, and moreover, the eels very often change their courses from one year to the other. The only fact known by fishermen is that they usually pass by the Island of Orleans, on their way to the sea, between September 15 and November 15. They follow the shore, but not always on a definite schedule. For instance, the fishermen of Ste. Petronille may have a very successful week while those of St. Laurent may have a poor one. Opposite results may be obtained on the following week.

The eels are carried to the city in moistened jute bags. The amount varies between three hundred to one thousand pounds, depending on the means of transportation. Upon arrival, they are inspected, and soft and injured eels are rejected. Soft eels are those that have died in the storage tanks and may be diseased or decayed. It is also important to discard injured eels or those that have been caught by hook or line, because these wounds will show up badly after the fish have been thawed out at their ultimate destination. They are then sorted according to size:—small are two pounds or less, medium are from two to four pounds, and

large are four pounds and over. The average size of eels is three and one-half pounds.

When all signs of life have vanished, the eels are placed in pans, prior to their freezing. The pans hold about six eels of the larger size, in a head-to-tail position, slightly bent, which allows the entire surface of the pan to be used. The smaller eels are placed in the same manner but in larger quantities, usually eight to ten. These pans are carried on hand trucks to the freezing room, where they are placed on brine coils. The temperature is between eight to ten degrees below zero, and drafts are eliminated as much as possible from the room, in order to prevent evaporation. Freezing the eels into a solid block takes from two to four hours. They are then withdrawn from the pans and dipped in water, for the purpose of glazing. This operation takes place in the cold room at a temperature of zero. The glazing consists of adding a thin coat of ice varying in thickness from one-sixteenth to one-eight of an inch. The glazing not only covers the outside surface of the fish, but also fills in all cracks and recessions, giving all air-proof protection against evaporation. The eels are then placed in wire-bound boxes for shipment. These boxes contain from 110 to 130 pounds of eels. They are labelled and bound in the cold room, where they will remain until shipment.

This industry brings thousands of dollars annually to some two hundred and twenty fishermen, in the vicinity of Quebec City. Other parts of the province also thrive on eels, notably on the Richelieu River, where Mr. Thuot has a large weir near St. John's, Que. The methods of this industry, on the Richelieu River, vary slightly from those of the Island of Orleans and in the vicinity of Quebec City. Mr. Thuot ships most of his eels fresh to New York City in flat bottom boats or packed in barrels between two layers of ice.

How are these strange fish prepared for epicures and what people relish them? Generally speaking, it may be said that the Germans consume the largest quantities of eels. The Italians, the Dutch, and Scandinavians also consume large quantities. Britishers are also partial to them, that is, the small variety, usually less than one pound in weight. New York City, with its large proportion of Italians and Germans, consumes annually two hundred thousand pounds of eels, which is approximately 20 per cent of the total exports from Canada.

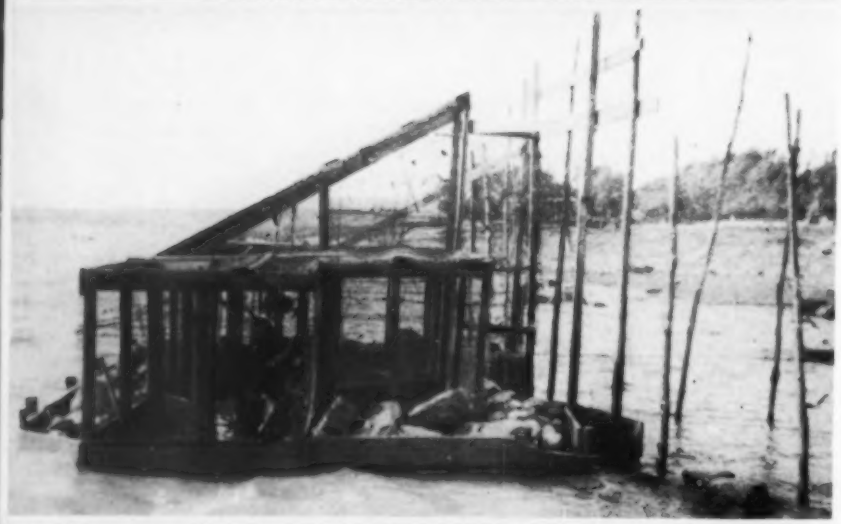
Connoisseurs appreciate eels in a large variety of dishes. Eel soup or eel chowder, fried eels, eels in tomato sauce, jellied eels as hors-d'oeuvre, smoked eels; these are only a few ways of preparing eels for the table. An Englishman or an American would not think of Thanksgiving, nor of Christmas, without a turkey, but an Italian would not consider Christmas Eve complete without the traditional eel feast. The New York Herald-Tribune, of December 11, 1937, gives several eel recipes for its Italian readers. These recipes would satisfy even the most exacting gourmets. Italian restaurants and Swedish Smorgasborgs both introduced them to the American public in the form of jellied eels, as hors-d'oeuvre. These are now considered as a delicacy, and have been recently used at cocktail parties in many American homes. The Germans, at home and abroad, relish eel dishes of many varieties. It is even possible to make up a menu with eels, much in the same way as we find "shore dinners" on the Atlantic coast.

A good many farmers and dwellers close to rivers fish eels for their own use, although not commercially. They eat eels fresh during the fall, and salt a certain quantity away for winter and spring use. This practice may be observed in many parts of North America, such as on the Richelieu River, the St. Lawrence River, Nantucket, Martha's Vineyard, Long Island, etc.

It is indeed a strange fact that most Canadians and Americans consider the eel as being lowly. The obvious reason is that the eel resembles the snake by its shape. Far from belonging to the snake family, the eel is in fact a cousin of the salmon. Furthermore, up-to-date research laboratories insist that, within the eel, is contained many valuable vitamins making it a very efficient food, as well as a palatable one.

Eel fishing in Quebec is indeed an industry worthy of attention, as these queer fish are the object of an important trade. The whole story of the eel, from its birth in the Sargasso Sea until it is trapped in weirs on the banks of the St. Lawrence River, is a romance which is carried to the four corners of the earth in tins, jars or frozen in boxes. The fishermen are plain, simple and honest folk; they fish eels for a living, and most of them are not aware of the part they play in the great drama of the eel.

The St. Lawrence River forms a bottle-neck in the vicinity of Quebec City and the Island of Orleans where tide waters rise to a maximum of fifteen feet. This weir will be completely submerged at high tide.



At low tide, fishermen wade out to their weirs and transfer the eels from the cage to the partly submerged storage tank. They also repair whatever damage may have been done at high tide and discard refuse caught in the entanglements of the weir.

This weir was beached during the past season and gave us an excellent opportunity to study its details and the ingenuity required to build it. The barrier, or approach would extend from the two posts in the foreground out to about one hundred yards towards shore. The storage tank may be seen in the far corner.

Eels remain alive for several hours after being taken out of the water. They are placed in these large compartments after their classification where they await subsequent operations of panning, freezing and packing.

EDITOR'S NOTE-BOOK

Robert J. C. Stead, noted author and lecturer and well-known to readers of the Journal, contributes in this issue another illuminating article in the Parks series entitled "Canada's Maritime Playgrounds". Mr. Stead spent considerable time last summer collecting data and photographs for the subject on which he writes.

Arturo Bascunan, author of "The Nitrate Industry in Chile" was born in Santiago, Chile. Educated at the Santiago National Institute he received his degree from the Agricultural College in 1918. In 1925 Mr. Bascunan was placed in charge of the newly created department to study agricultural economics and had much to do with its development and progress. In 1930 he was appointed the Chilean Consul General to San Francisco and in 1934 made Consul General to Canada.

Francis T. Gill, whose article entitled "Canada Talks by Telephone" appears in this issue, was born in Ottawa, where his early education was received. He graduated from McGill University, Montreal, in 1930, joining the Bell Telephone Company of Canada at Ottawa. He was subsequently transferred to Kingston and several years later to Montreal, where he is in touch with various phases of telephonic activity; domestic and foreign.

E. P. Laberge, who contributes in this issue an authoritative article dealing with an interesting industry, "Eel Fishing in Quebec" received the degree of Doctor of Commerce from the University of Montreal in 1934. As Chief of the Commercial and Industrial Intelligence Service for the province of Quebec, Mr. Laberge became thoroughly familiar with the subject on which he writes.

AMONGST THE NEW BOOKS

Wildfowling with a Camera by LORENE SQUIRE (J. B. Lippincott Company, $7.50).

Those who have seen the samples of Miss Lorene Squire's wild life photography in the January *Canadian Geographical Journal* will undoubtedly welcome the opportunity afforded by this work to journey afield with her in search of birds and to examine the splendid collection of bird pictures it contains. The author counts one good photograph of a bird for forty taken as satisfactory, indicating the high standard she has set herself. There are in this work one hundred full page pictures reproduced in Aquatone, which the publishers consider the best process for the purpose.

The text tells of journeys and adventures from Kansas to the Canadian Prairies undertaken for the purposes of bird study and bird photography. The narrative is as bright as the pictures, and that is saying a lot. A splendid contribution has been made by Miss Squire to extending popular interest in Canada's wild birds. HOYES LLOYD.

Ten Years Under The Earth by NORBERT CASTERET; Preface by E. A. MARTEL. Translated and edited by BARROWS MUSSEY. (The Greystone Press, New York, $3.50).

This is a book probably vastly different than anything you have previously read. Its fascinating story outrivals Jules Verne's "Journey to the Centre of the Earth", yet it is not fiction. It is the story of the author's explorations in hundreds of caverns deep within the earth's crust. Most of them have been discovered by himself in his insatiable desire to find and map subterranean caverns and streams.

Until Casteret began his subterranean studies in the Pyrenees, only a few notable caverns were known, but he has added scores to the list of caves, grottoes and underground rivers. By his explorations he settled the long-existing controversy over the true source of the Garonne River, using a sensational coloration text to confirm his deductions from his underground examination of the locality.

His daring and original methods of passing obstacles, sometimes by swimming underwater up an underground stream hoping to find an air pocket or cavern before his breath gave out, would overcome the average explorer. His physical fitness, with body schooled to hardship and ready for risks, and his great courage and daring assisted him in overcoming the hardships and dangers encountered, and he was frequently ably assisted by his mother and wife, both of whom were explorers and mountaineers by instinct.

Among the numerous interesting things brought to light by Casteret are many valuable archaeological specimens. Many of the caverns were once occupied by men who lived in very remote times, and the remains of their culture are found here. The oldest statues in the world were found by Casteret and etchings and paintings on the walls and roofs are vividly described. These depict man's earliest attempt at art, and show the relations man had with the contemporaneous animals such as the great extinct cave bear, the hyena, horse, lion and others. There are etchings of mysterious symbols of some ancient rites performed perhaps 20,000 years ago. Many of these drawings and paintings are strikingly realistic. Some of the statues are pitted with wound marks, suggesting some rite that

the hunters performed before they went to the chase, and there, in the caverns they enacted rehearsals of the methods of approach and attack, and the models of the animals were wounded with the javelin or dart. Phantom mutilated hand prints were discovered on the walls of some caves. Footprints of bears and men were discovered in the mud of the caves. What a thrill the explorer must have had when he first saw the footprint of a man extinct some thousands of years.

The geological information is equally as interesting. His descriptions of stalactites, stalagmites, helictites, and the rare stone flowers and pearls add valuable information to what has already been known of these marvellous forms. He discovered an underground glacier. He went sliding on an underground lake, and discovered the deepest cavern in France. All these exploits are vividly described, but read them for yourselves.

The preface of the book is by Edouard-Alfred Martel, a noted geologist who himself has done considerable investigation of subterranean phenomena and has assisted and advised Casteret on many occasions. The illustrations are numerous and contain reproductions of some photographs taken under exceedingly difficult and unusual conditions. The French edition of the book has been especially well received and the translated one should be equally as popular.

The occasional editorial notes introduced in mid-page form do not seem to be necessary, and might have been added as foot-notes or better as an appendix.

The Geographical Laboratory by GRIFFITH TAYLOR (The University of Toronto Press, Toronto, 1938. Price—$1.50).

This new volume of Professor Taylor's is a practical handbook providing material for a three years' course in North American Universities.

It is divided into four parts, giving skeleton headings for the series of lectures and laboratory exercises:

1. First year lecture synopsis.
2. First year laboratory.
3. Second year laboratory.
4. Third year laboratory.

The lectures for the first year deal with Topography, Land Forms and Climatology in general, followed by detailed studies of each continent under the headings of Build, Climate and Vegetation, and Man and Resources.

Part 2 gives a synopsis of the laboratory work essential to the course and consists of elementary map reading, Simple Surveys, Elements of Structure, use of Weather Maps and Instruments, the Construction of various Map Projections, and the Correlation between Continental Structure and Economics.

Part 3 is a second year course giving an outline of 16 lectures covering the Fundamentals of Human Distribution, and 25 lectures on the Cultural Geography of Europe.

The Laboratory work of the second year provides advanced studies in Surveying Map Projections, Use of Instruments, Map Interpretation, Racial Distribution and Geographic Statistics.

Part 4, third year course, provides 20 lectures in Advanced Climatology and 25 lectures in Land Settlement, especially in Canada, Australia and other pioneer lands. The laboratory work (a) covers general problems in Climatology and the reading of graphs; (b) Principles of Navigation and

general problems in fixing positions by different methods; (c) Miscellaneous problems, such as Ink drawings for reproduction in illustrating reports, Topographical sketching, Construction of Relief models, and in Practical Surveying of a small area adjacent to Toronto.

The chief reference texts are Taylor's—Environment, Race and Migration; Environment and Nation, and his other writings on allied subjects, with reference to standard text books on the specialized topics introduced in the course.

The three years' plan of study appears to be well balanced, and the introduction of a considerable amount of physiography, practical map and chart reading, model construction, surveying, and instruction in the art of reproducing illustrations for publication in reports should give the students of this course much useful information not generally given to such an extent in geographic courses in most universities.

Cryologia Maris by JOSEF ZUKREIGEL, Ph. Dr., Ph. Mr., Geographical Institute of the Charles IV University, Praha—1935.

It has been said that whoever has once visited the region of the polar seas, faithfully returns to them. So did the author of Cryologia Maris. Having acquired, in his youth, a keen interest in polar exploration, through reading books on the voyages of various explorers to the Arctic and Antarctic, provided by his father, his longing to visit "the glacial seas" remained with him, even after his experiences in the World War, from which he returned "with a pure heart". This longing was eventually gratified by his visiting the North polar region up as far as latitude 82° and his personal knowledge was further enhanced by his association with some of the Arctic research institutes which assisted in providing material for his book.

The volume is divided into two parts; first, a general discussion of sea-ice and its investigation from a genetic standpoint; second, a dissertation in which is described the inner nature of sea-ice, its environment, and its influence on adjacent and distant regions. In this is outlined various ice phenomena and the climate and life of the ice-bound areas. A very comprehensive history of the investigation of sea-ice is given, from the first mention of it by Pytheas in 350 B. C. on down through the Middle Ages to the time of Davis, Parry, Baffin, Franklin, Nordenskjold, Nansen and many others. The references are voluminous.

The importance of cryological studies is emphasized and mention is made of the various countries having organizations studying ice and associated phenomena. The general character of the polar seas and their currents, the types of sea-ice and their location are thoroughly discussed in the last chapters, and a genetic classification of sea-ice into forms due to Destruction and Construction is proposed.

The book is a serious and comprehensive text on the subject. It is admirably illustrated by clear views of various ice phenomena and there are a few excellent reproductions of some of the old 14th century maps. It is a splendid book for the perusal of those whose interest is especially in the "white deserts of ice" or for those who desire a general knowledge of a little known and little understood subject.

D. A. NICHOLS.

FUR RESOURCES TO BE MANAGED

Delegates to the Provincial-Dominion Wild Life Conference, arranged by the Department of Mines and Resources and held in Ottawa, January 16, 17 and 18, were told that in all the provinces and territories steps are being taken to insure the perpetuation of the fur industry by careful conservation of the fur-bearing animals. Great areas are being devoted to the production of fur, and special care is being taken in the issuing of hunting and trapping licences in order to prevent excessive exploitation of the fur resources.

Particular emphasis was placed on the need of safeguarding the future livelihood of the Indian population. Thousands of Indians depend on trapping for a living and unless the fur resources remain adequate for their support it will be necessary to increase relief for these people. Wilderness areas across Canada are being closed to non-resident trappers for the benefit of the natives, and in British Columbia, where the system of trap-line registration is in vogue, a large number of trapping areas are reserved for the Indians.

Many conservation measures are being carried out in the various provinces. In the Northwest Territories, Alberta, Manitoba and Saskatchewan water control projects to restore the muskrat habitat are under way. Enormous areas in northern Quebec have been set aside as beaver sanctuaries, and the beaver is also receiving particular attention in New Brunswick.

All provincial officials at the conference stressed the importance of preventing interprovincial shipments of illegally taken furs, and a number of resolutions for the general improvement of wild life conditions throughout the Dominion were approved. A special resolution was adopted commending Lt.-Col. H. H. Ritchie, of New Brunswick, chairman of the conference, for the efficient manner in which he directed the proceedings of the meetings.